

50

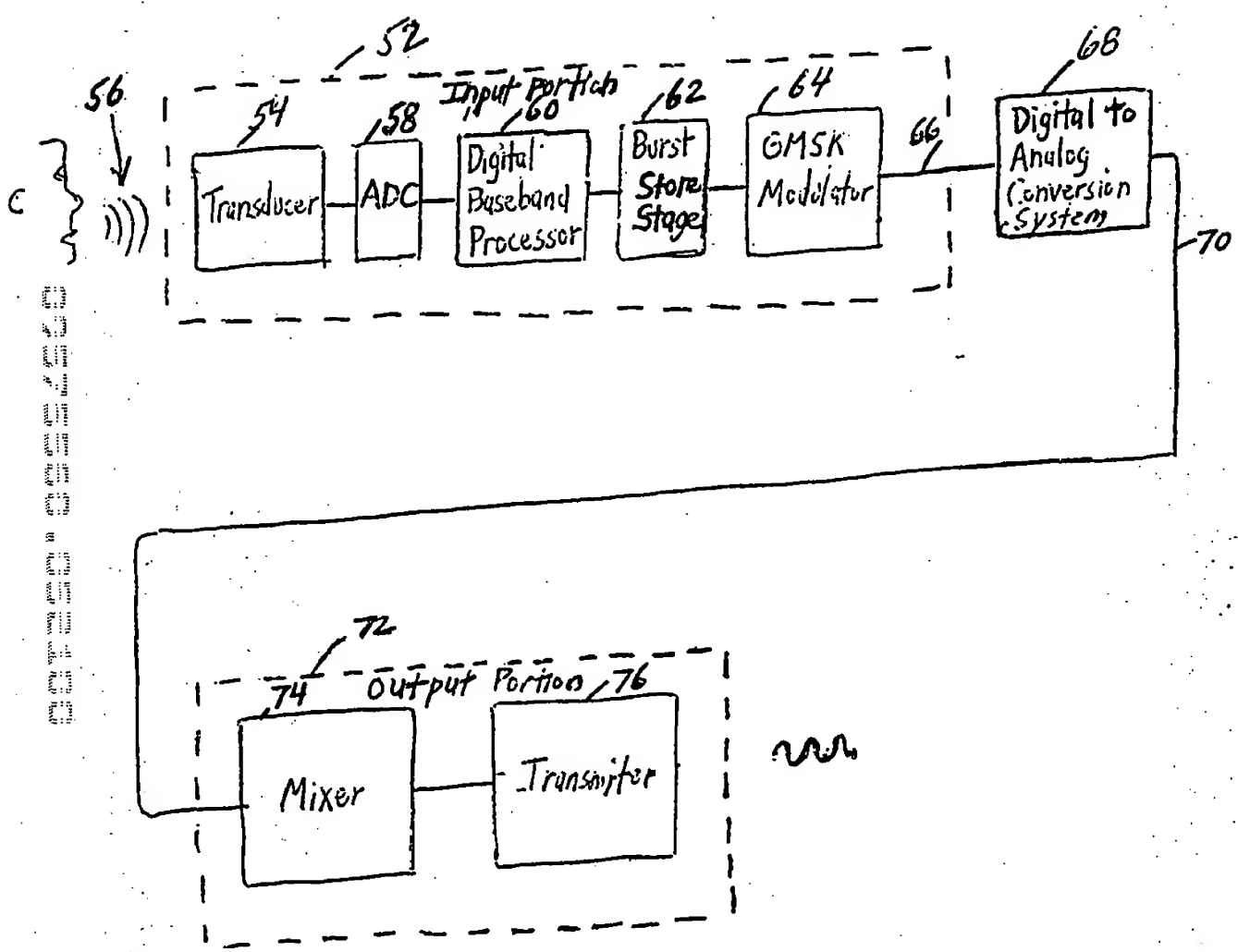


FIG. 1

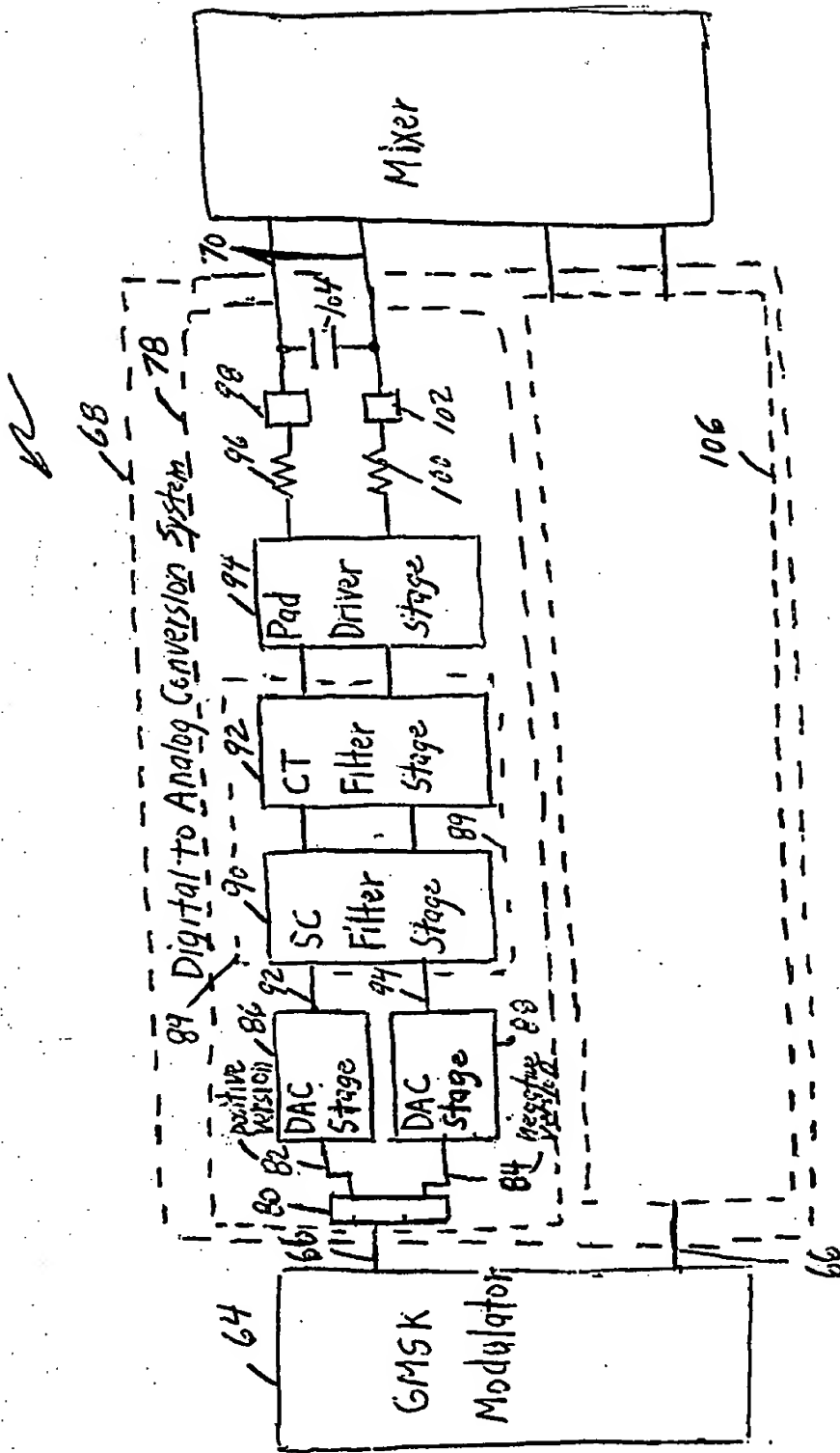


FIG. 2

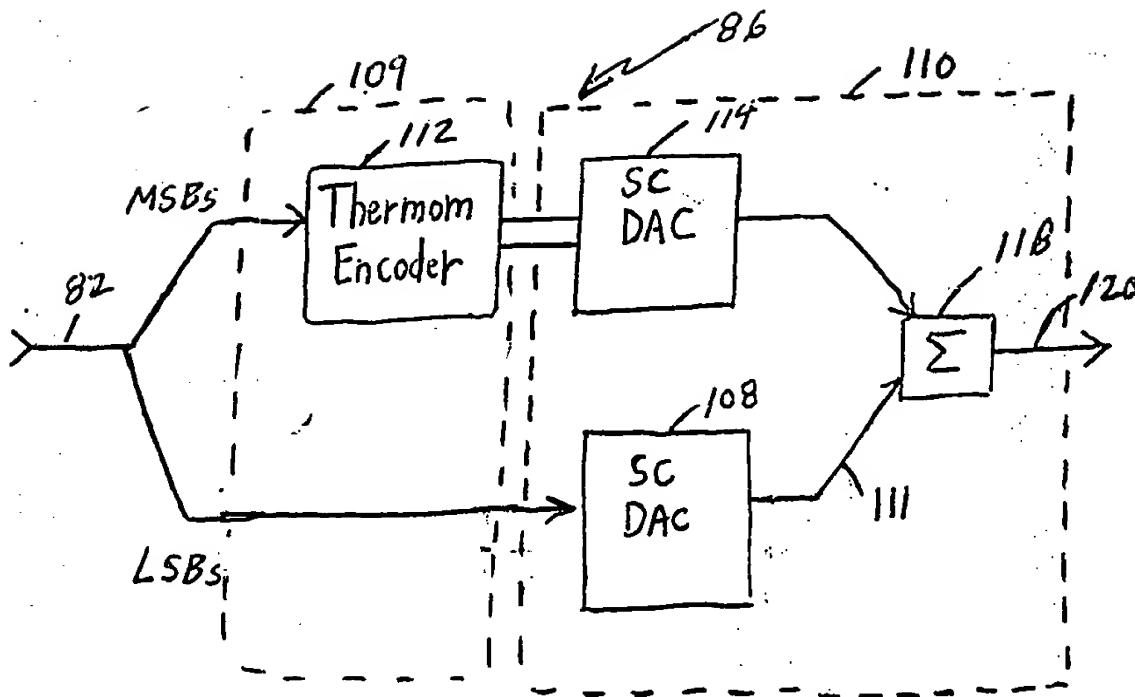


FIG. 3

V150

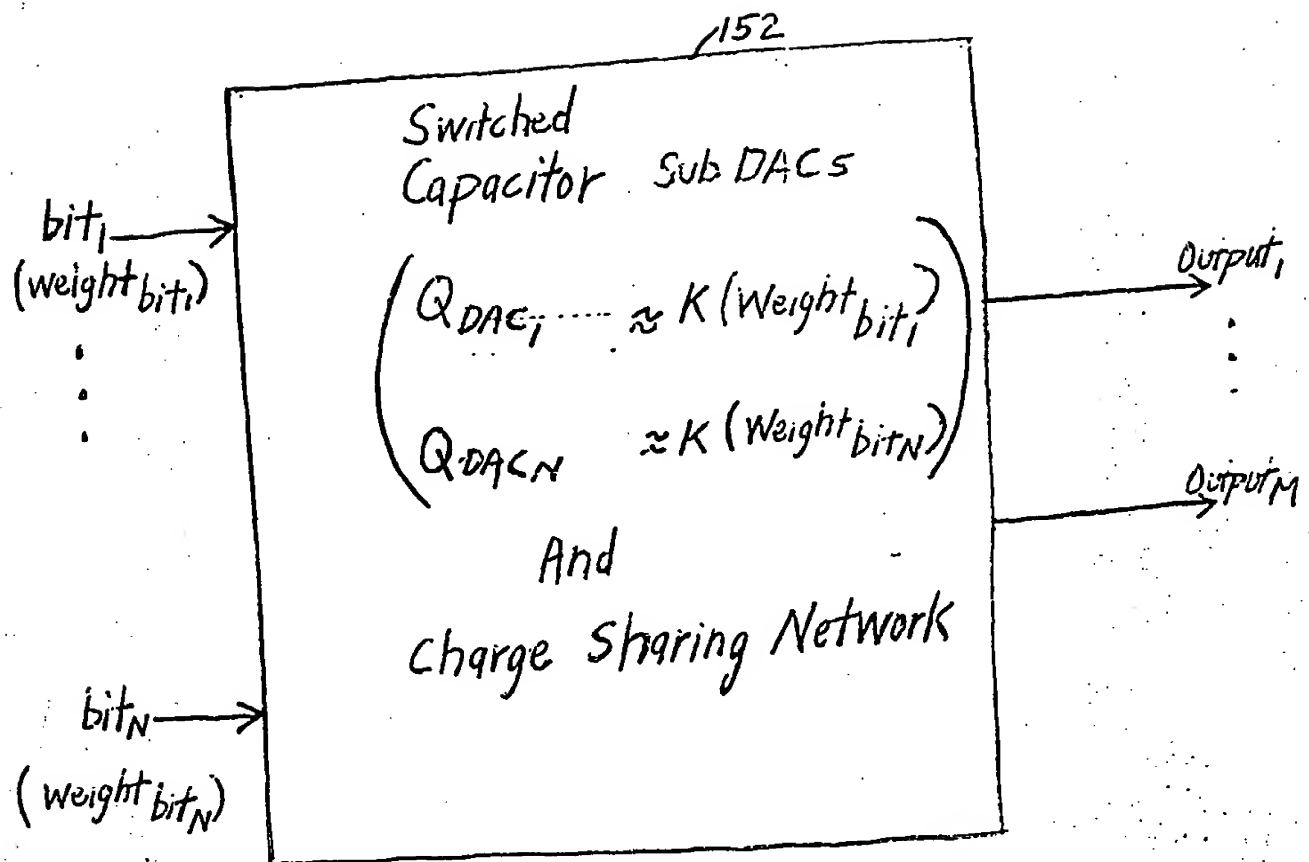


FIG. 4

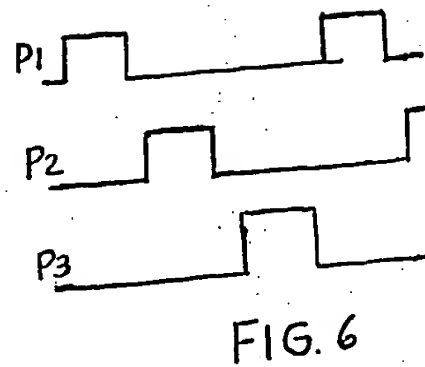
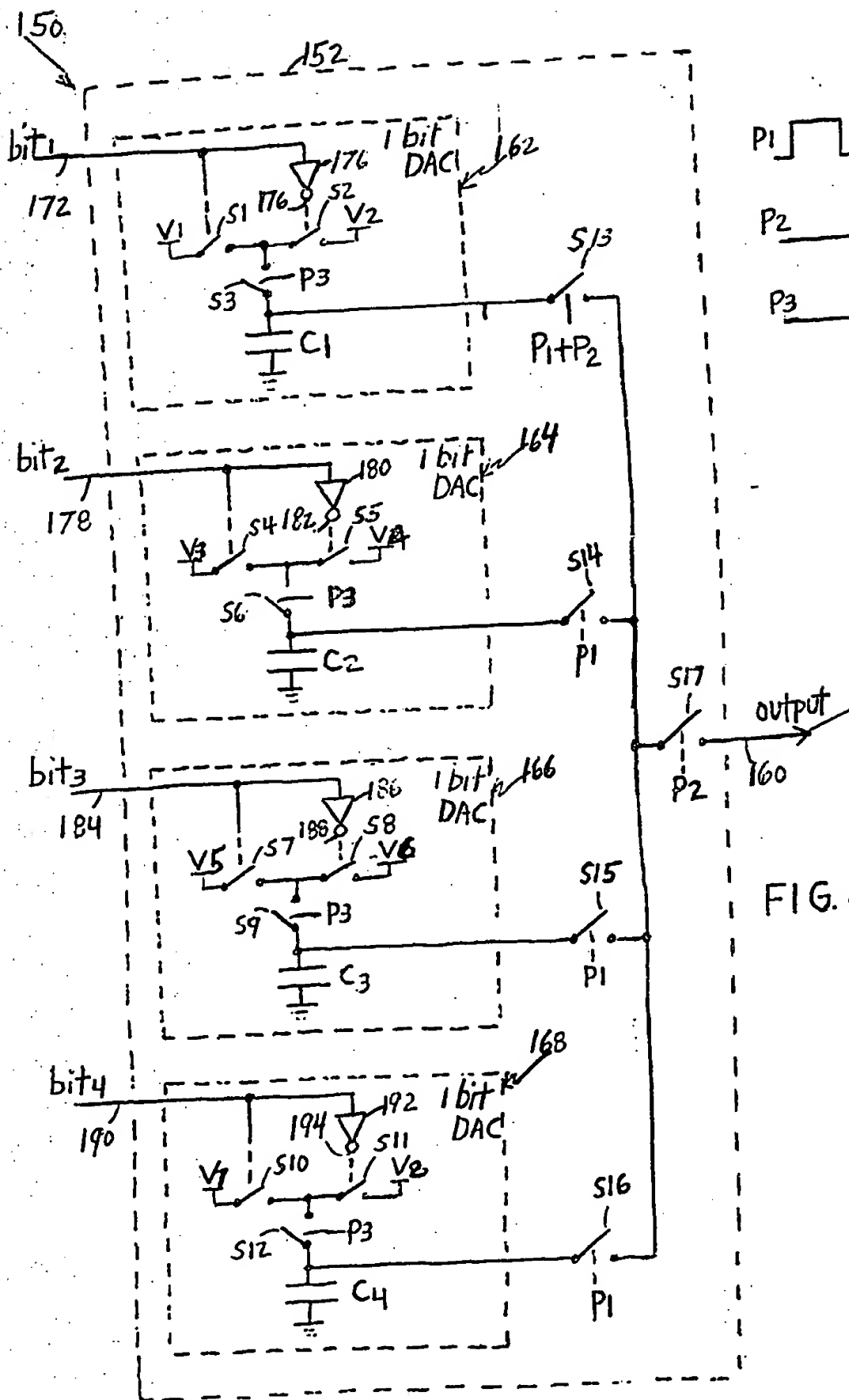
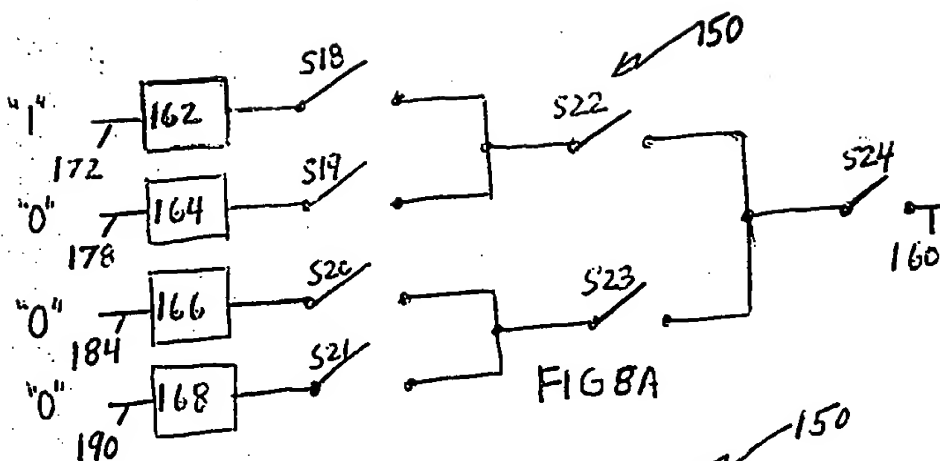
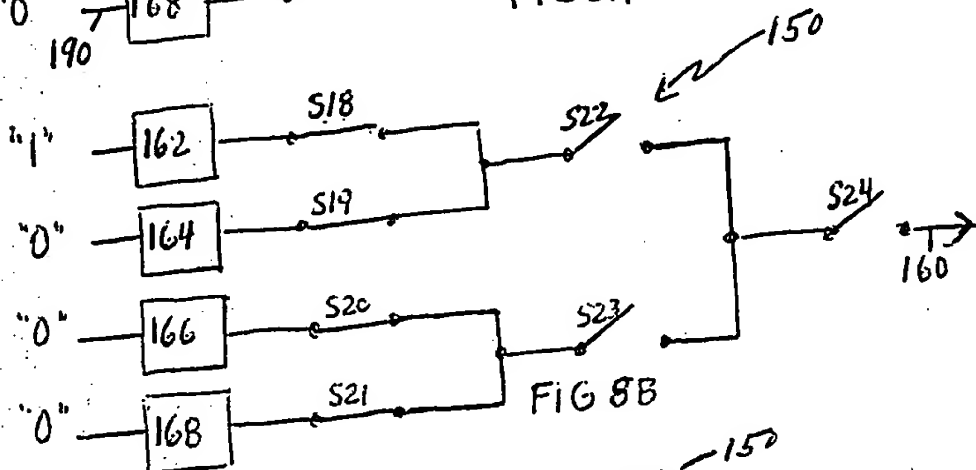


FIG. 5

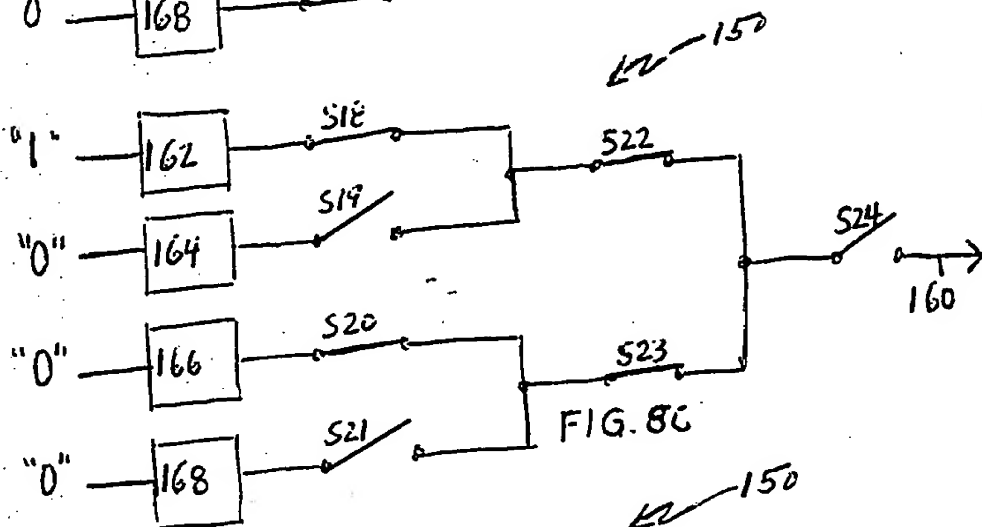
FIG. 6



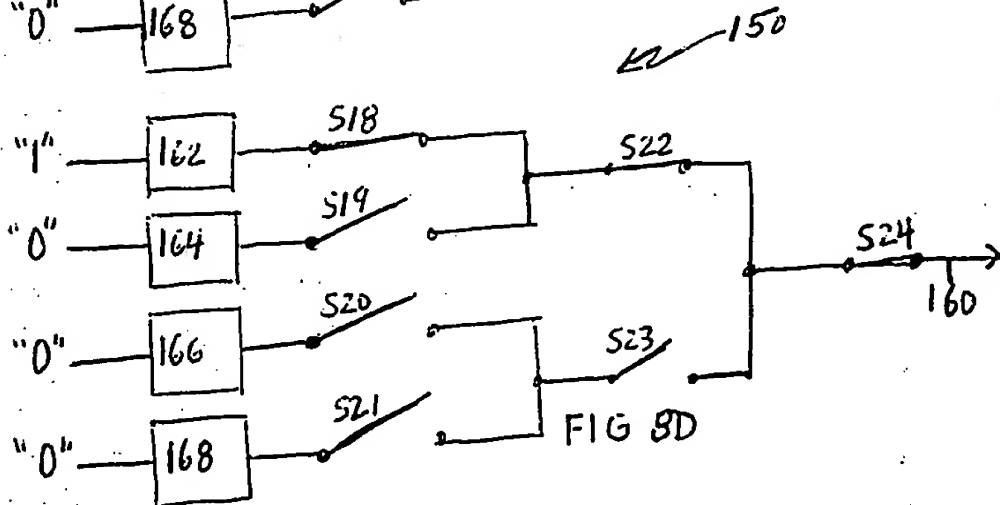
$P1=0$	$V(C1)=V_{ref}$	$Q(C1)=C \cdot V_{ref}$
$P2=0$	$V(C2)=0$	$Q(C2)=0$
$P3=1$	$V(C3)=0$	$Q(C3)=0$
$P4=0$	$V(C4)=0$	$Q(C4)=0$



$P1=0$	$V(C1)=V_{ref}/2$	$Q(C1)=C \cdot V_{ref}/2$
$P2=0$	$V(C2)=V_{ref}/2$	$Q(C2)=C \cdot V_{ref}/2$
$P3=0$	$V(C3)=0$	$Q(C3)=0$
$P4=1$	$V(C4)=0$	$Q(C4)=0$



$P1=1$	$V(C1)=V_{ref}/4$	$Q(C1)=C \cdot V_{ref}/4$
$P2=0$	$V(C2)=V_{ref}/2$	$Q(C2)=C \cdot V_{ref}/2$
$P3=0$	$V(C3)=V_{ref}/4$	$Q(C3)=C \cdot V_{ref}/4$
$P4=0$	$V(C4)=0$	$Q(C4)=0$



$P1=0$	$V(C1)=V_{ref}/4$	$Q(C1)=C \cdot V_{ref}/4$
$P2=1$	$V(C2)=V_{ref}/2$	$Q(C2)=C \cdot V_{ref}/2$
$P3=0$	$V(C3)=V_{ref}/4$	$Q(C3)=C \cdot V_{ref}/4$
$P4=0$	$V(C4)=0$	$Q(C4)=0$

Master
Clock

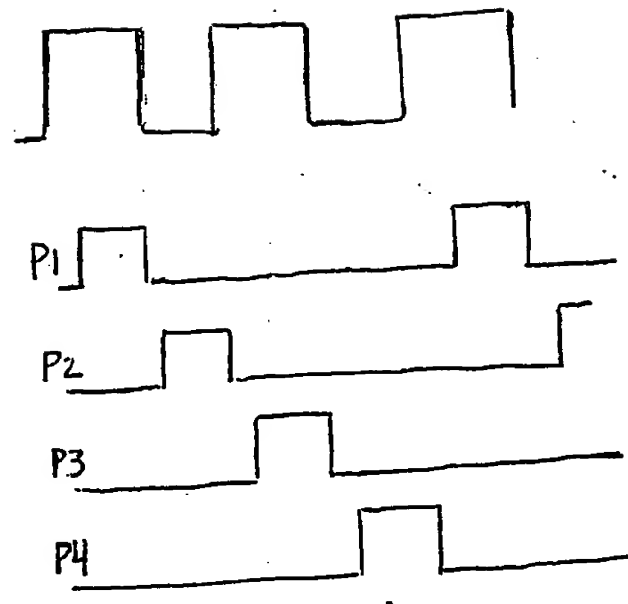


FIG 9

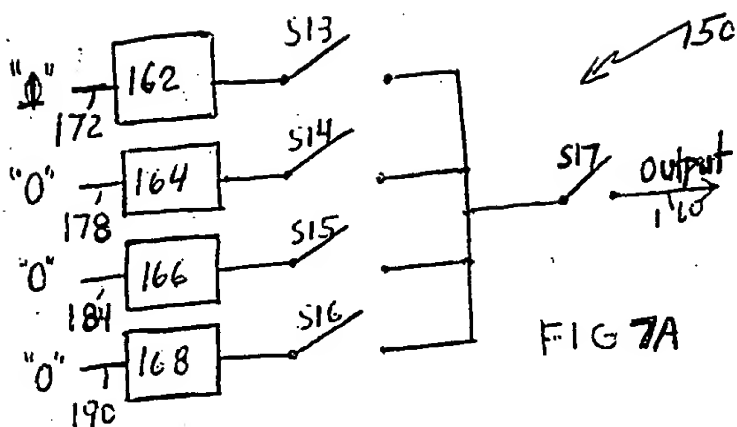


FIG 7A

P1 "0"	$V(C_1) = V_{ref}$	$Q(C_1) = C + V_{ref}$
P2 "0"	$V(C_2) = 0$	$Q(C_2) = 0$
P3 "1"	$V(C_3) = 0$	$Q(C_3) = 0$
	$V(C_4) = 0$	$Q(C_4) = 0$

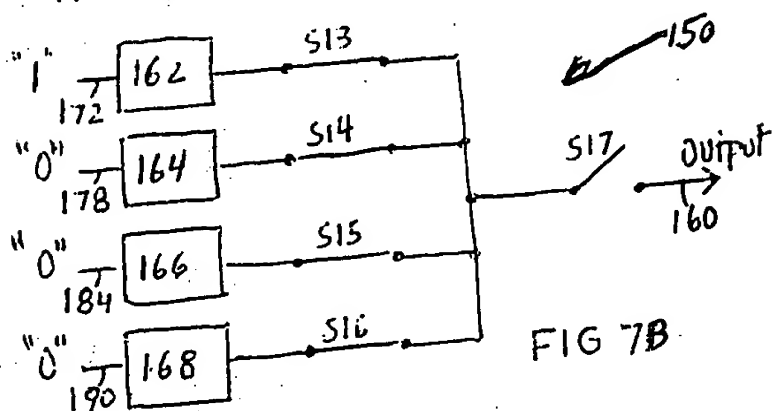


FIG 7B

P1 "1"	$V(C_1) = V_{ref}/4$	$Q(C_1) = C + V_{ref}/4$
P2 "0"	$V(C_2) = V_{ref}/4$	$Q(C_2) = C + V_{ref}/4$
P3 "0"	$V(C_3) = V_{ref}/4$	$Q(C_3) = C + V_{ref}/4$
	$V(C_4) = V_{ref}/4$	$Q(C_4) = C + V_{ref}/4$

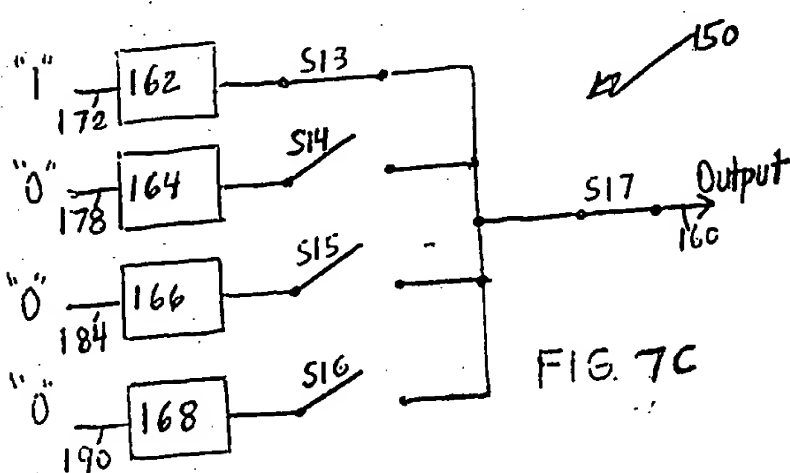


FIG 7C

P1 "0"	$V(C_1) = V_{ref}/4$	$Q(C_1) = C + V_{ref}/4$
P2 "1"	$V(C_2) = V_{ref}/4$	$Q(C_2) = C + V_{ref}/4$
P3 "0"	$V(C_3) = V_{ref}/4$	$Q(C_3) = C + V_{ref}/4$
	$V(C_4) = V_{ref}/4$	$Q(C_4) = C + V_{ref}/4$

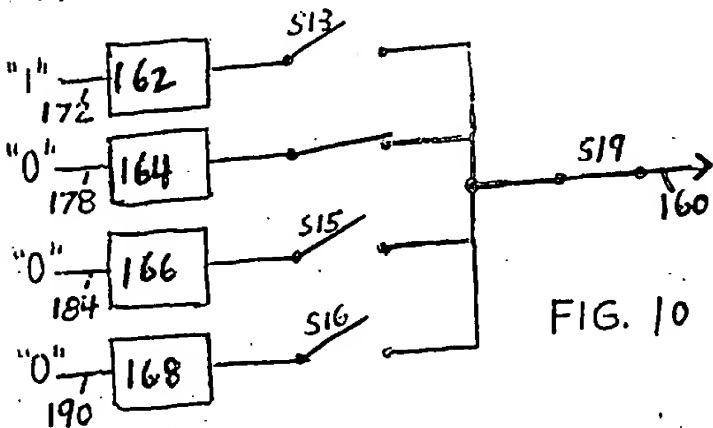
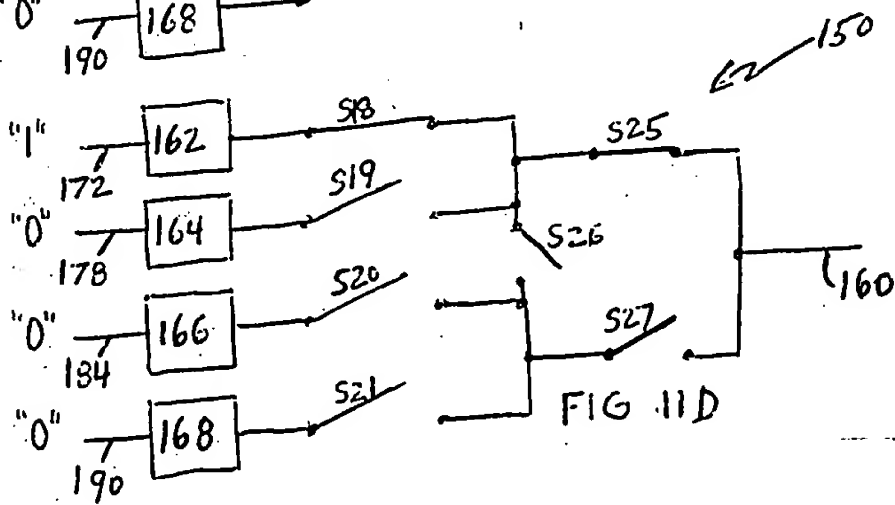
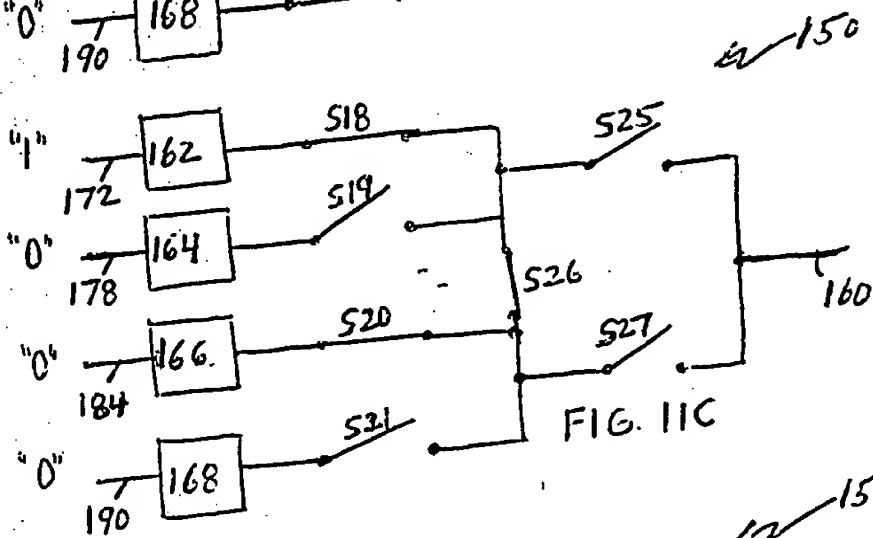
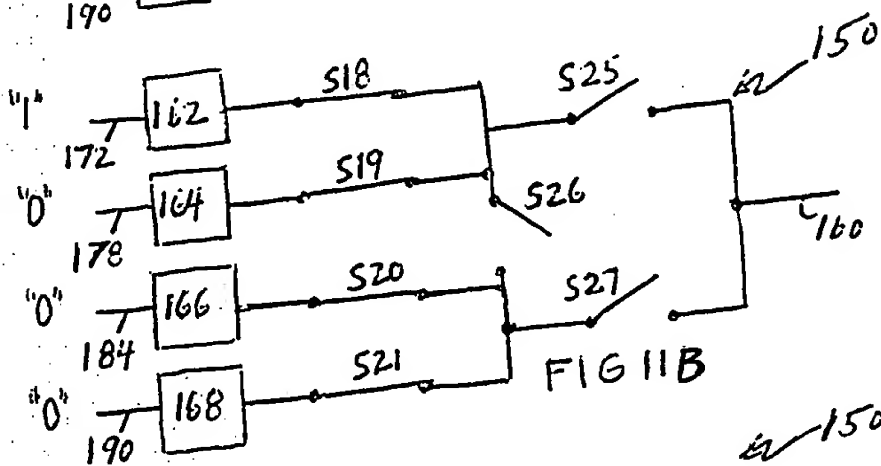
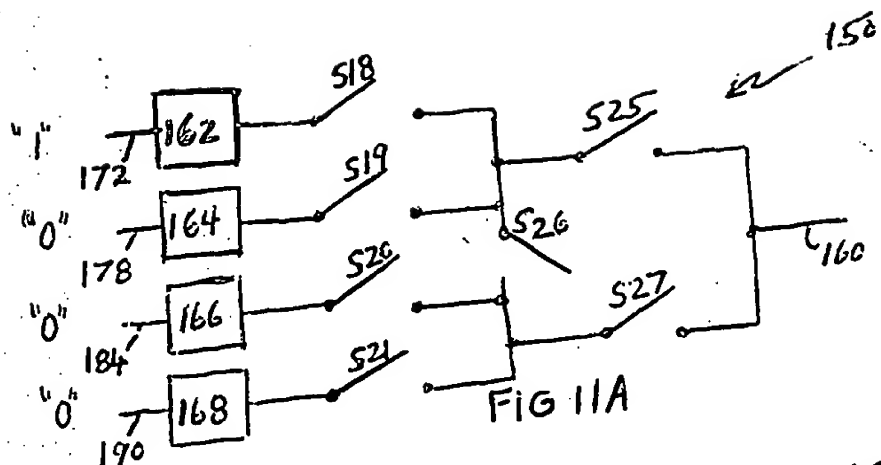
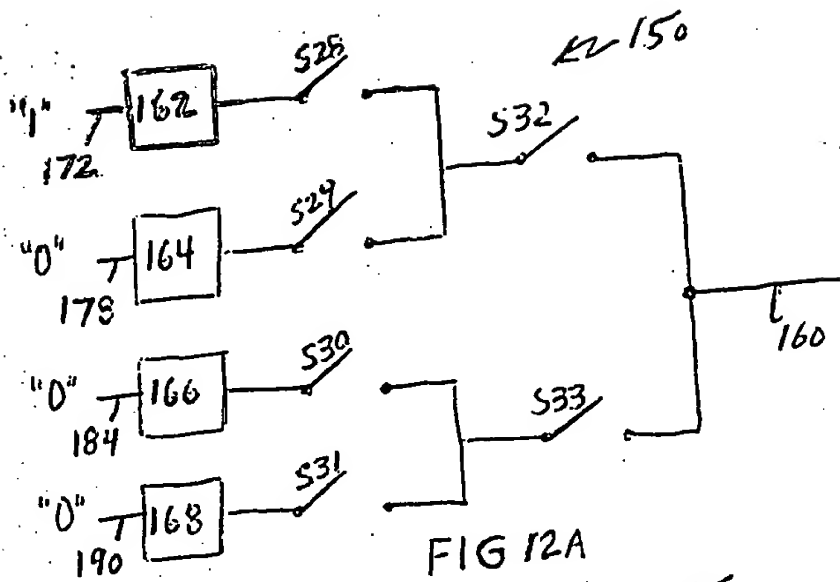
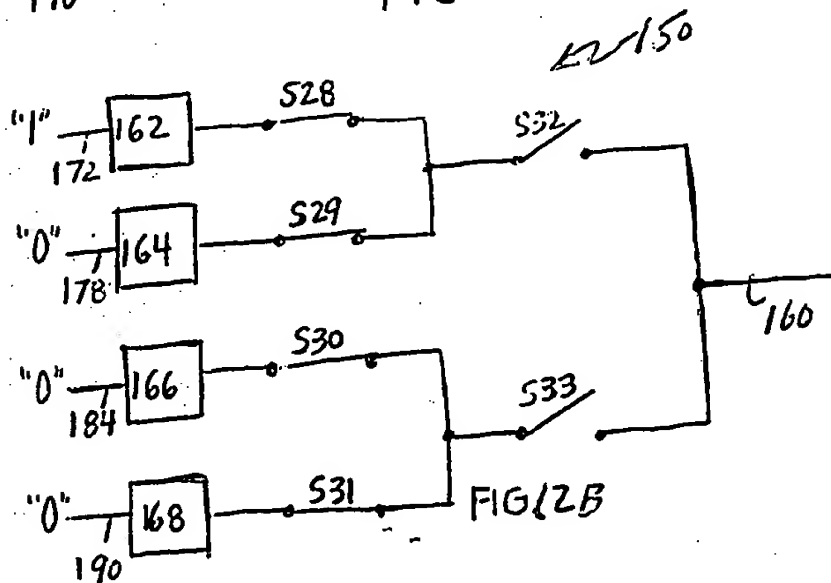


FIG. 10

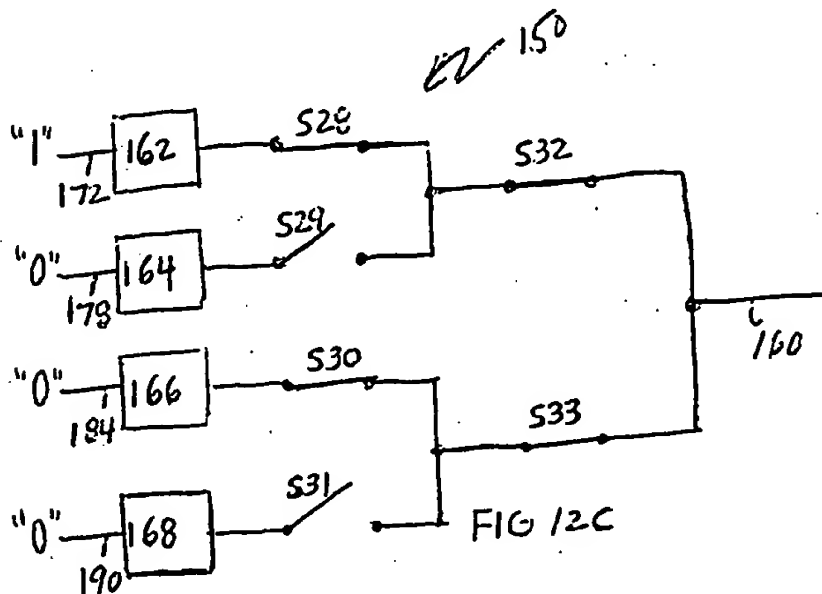




$P1=0$	$V_C1=V_{ref}$	$Q_C1=C \times V_{ref}$
$P2=0$	$V_C2=0$	$Q_C2=0$
$P3=1$	$V_C3=0$	$Q_C3=0$
	$V_C4=0$	$Q_C4=0$



$P1=1$	$V_C1=V_{ref}/2$	$Q_C1=C \times V_{ref}/2$
$P2=0$	$V_C2=V_{ref}/2$	$Q_C2=C \times V_{ref}/2$
$P3=0$	$V_C3=0$	$Q_C3=0$
	$V_C4=0$	$Q_C4=0$



$P1=0$	$V_C1=V_{ref}/2$	$Q_C1=C \times V_{ref}/2$
$P2=1$	$V_C2=V_{ref}/2$	$Q_C2=C \times V_{ref}/2$
$P3=0$	$V_C3=0$	$Q_C3=0$
	$V_C4=0$	$Q_C4=0$

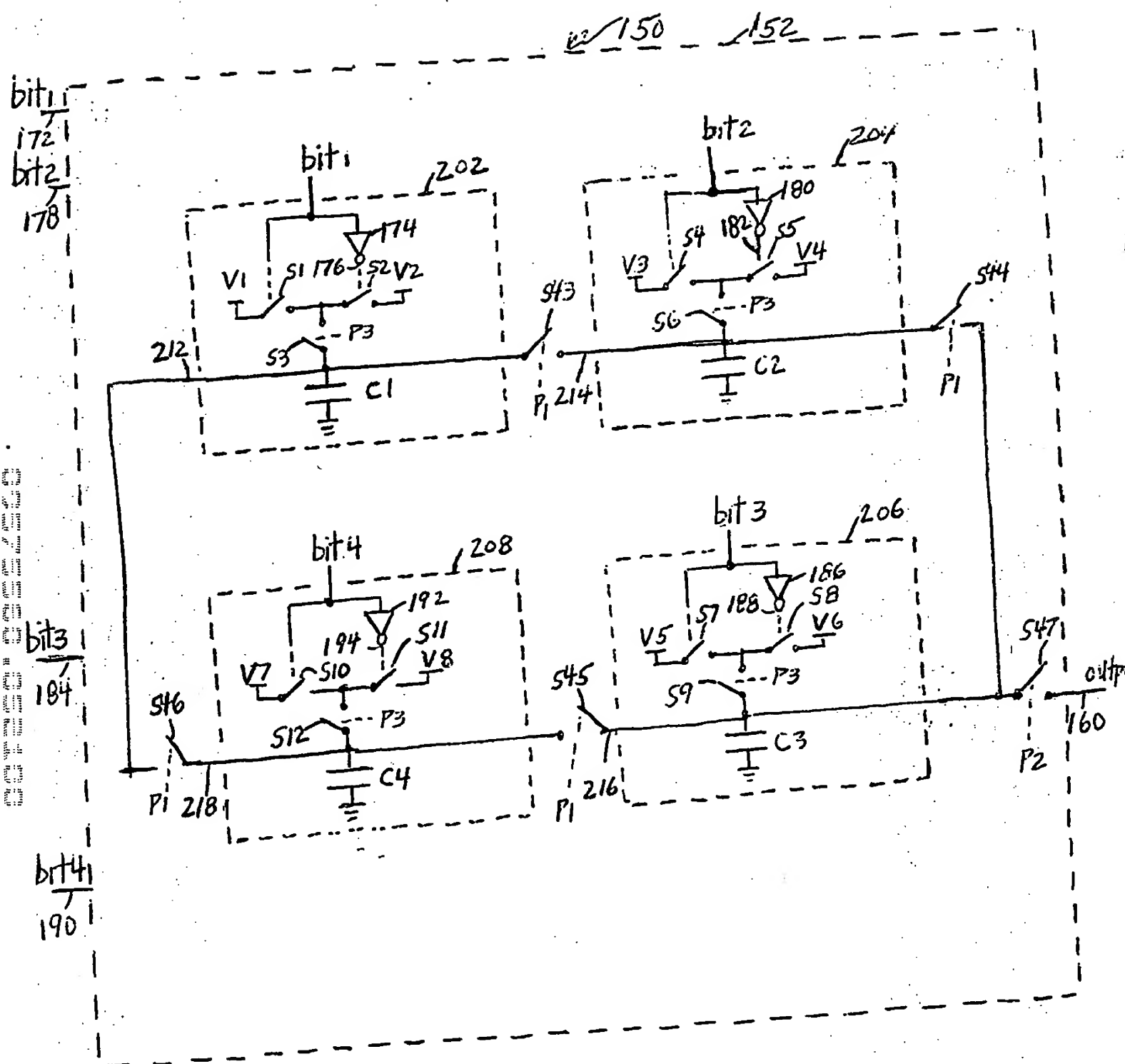
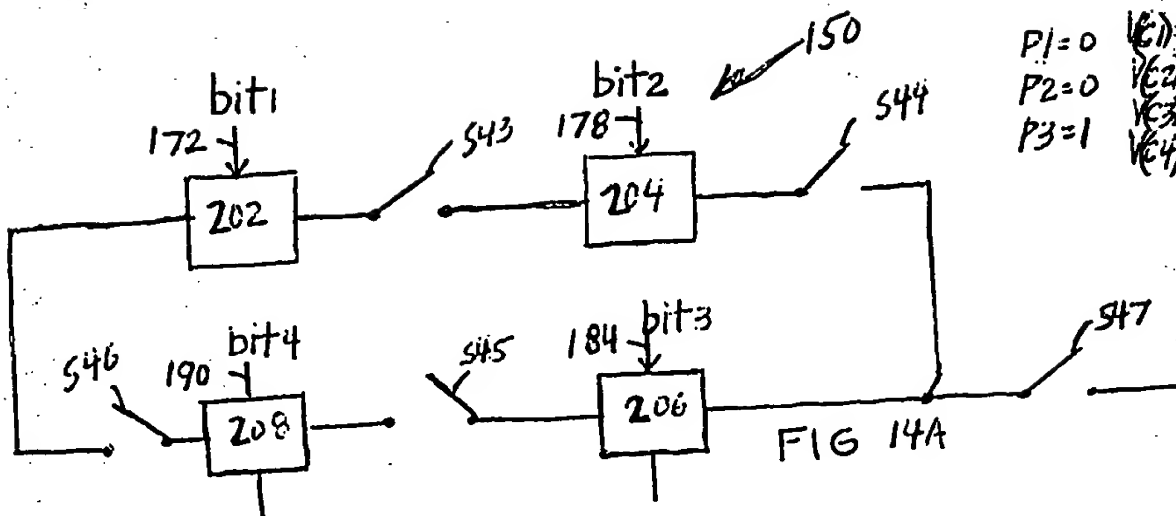
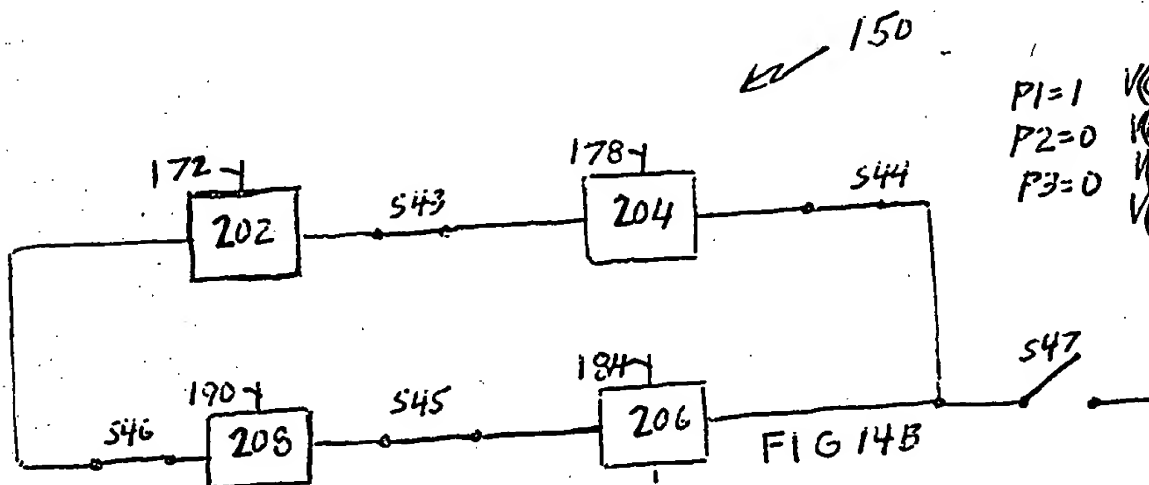


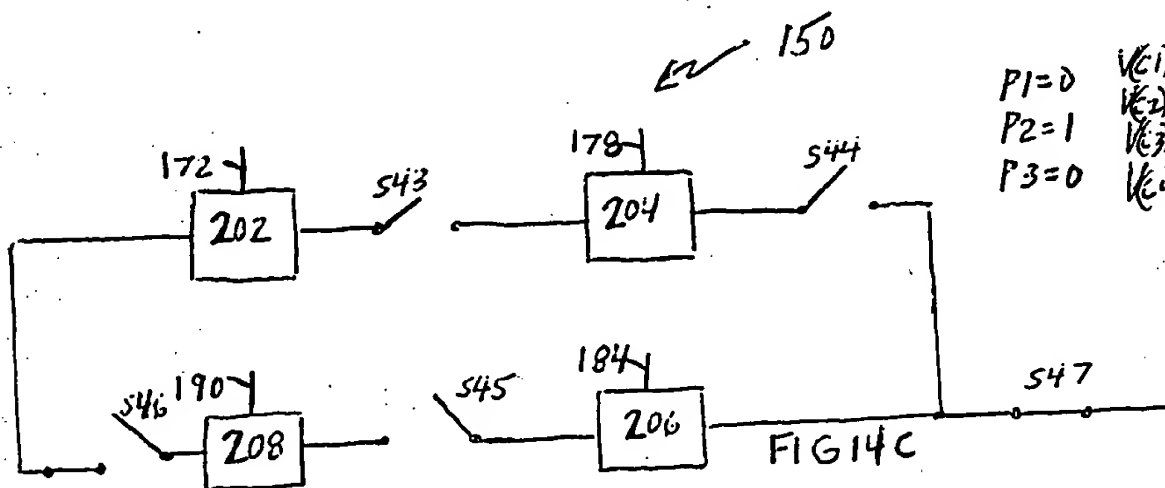
FIG. 13



$$\begin{array}{lll}
 P1=0 & V_{C1}=V_{ref} & Q_{C1}=C \times V_{ref} \\
 P2=0 & V_{C2}=0 & Q_{C2}=0 \\
 P3=1 & V_{C3}=0 & Q_{C3}=0 \\
 & V_{C4}=0 & Q_{C4}=0
 \end{array}$$



$$\begin{array}{lll}
 P1=1 & V_{C1}=V_{ref}/4 & Q_{C1}=C \times V_{ref}/4 \\
 P2=0 & V_{C2}=V_{ref}/4 & Q_{C2}=C \times V_{ref}/4 \\
 P3=0 & V_{C3}=V_{ref}/4 & Q_{C3}=C \times V_{ref}/4 \\
 & V_{C4}=V_{ref}/4 & Q_{C4}=C \times V_{ref}/4
 \end{array}$$



$$\begin{array}{lll}
 P1=0 & V_{C1}=V_{ref}/4 & Q_{C1}=C \times V_{ref}/4 \\
 P2=1 & V_{C2}=V_{ref}/4 & Q_{C2}=C \times V_{ref}/4 \\
 P3=0 & V_{C3}=V_{ref}/4 & Q_{C3}=C \times V_{ref}/4 \\
 & V_{C4}=V_{ref}/4 & Q_{C4}=C \times V_{ref}/4
 \end{array}$$

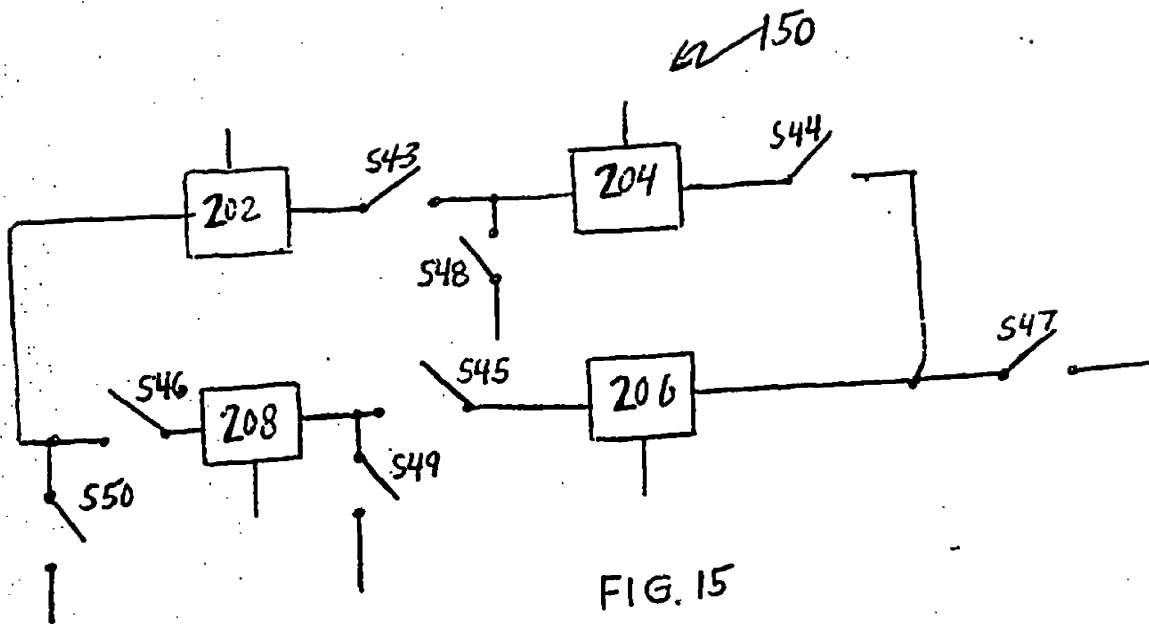


FIG 16A

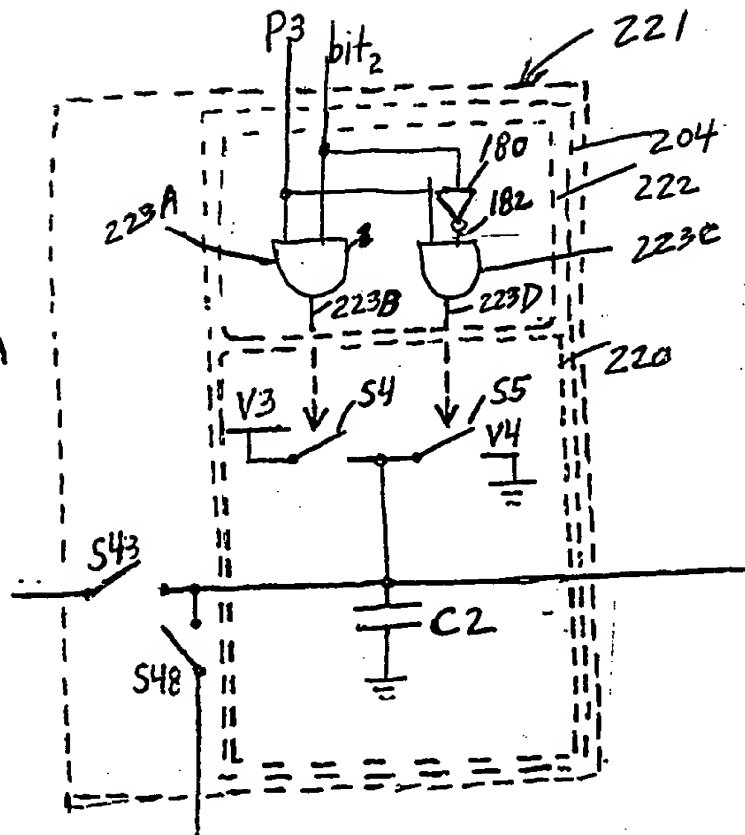
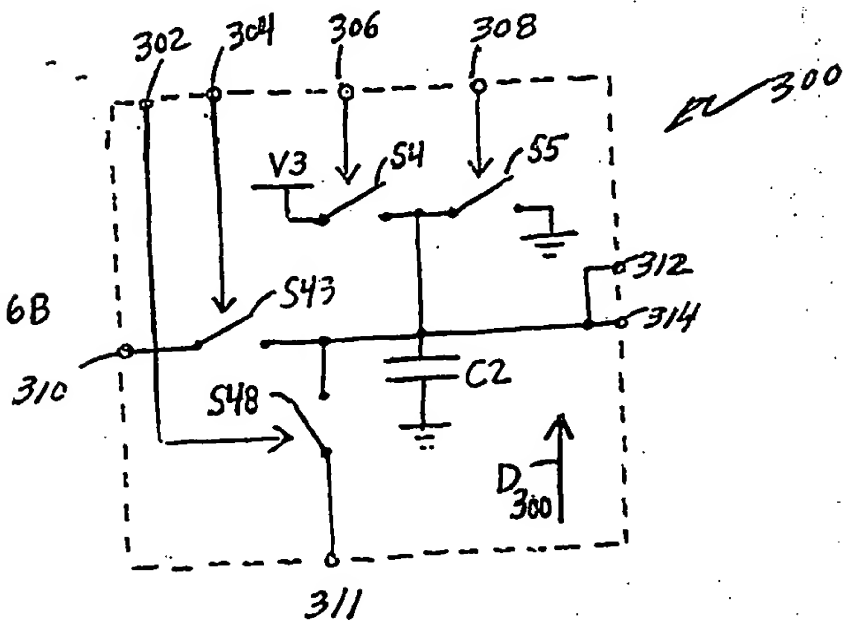


FIG 16B



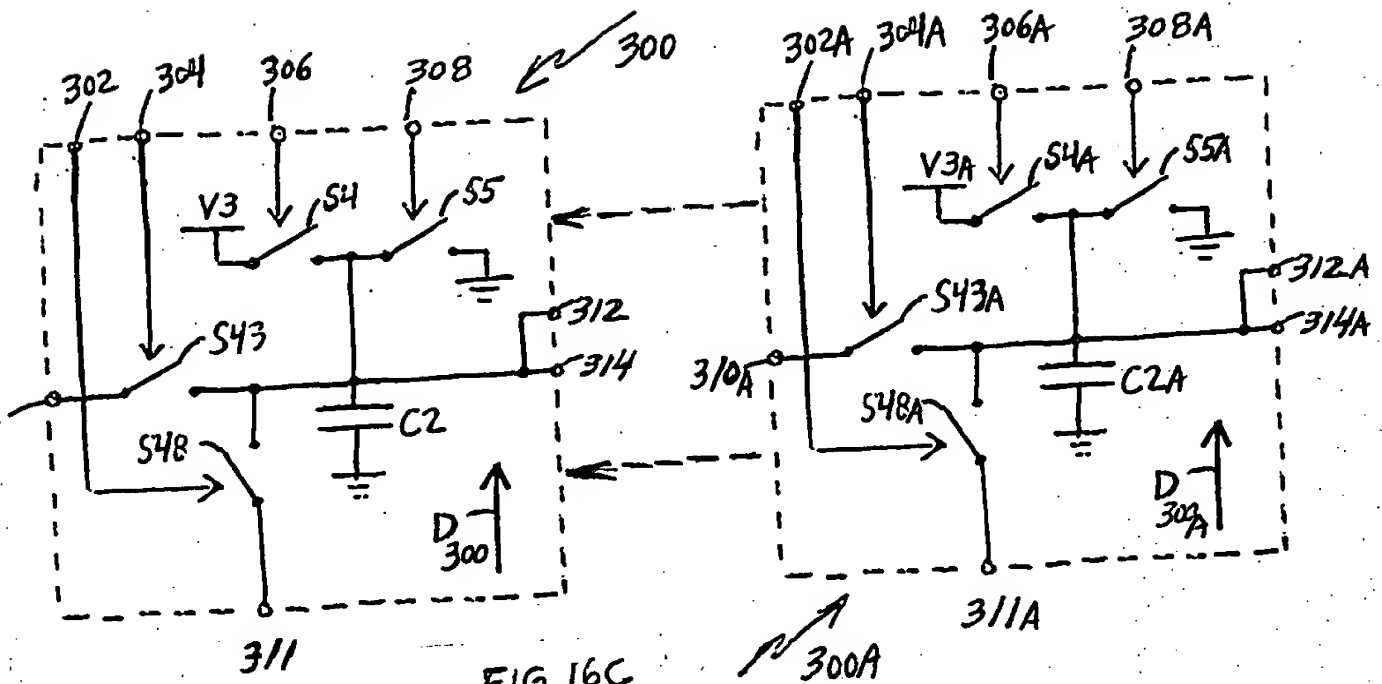


FIG 16C

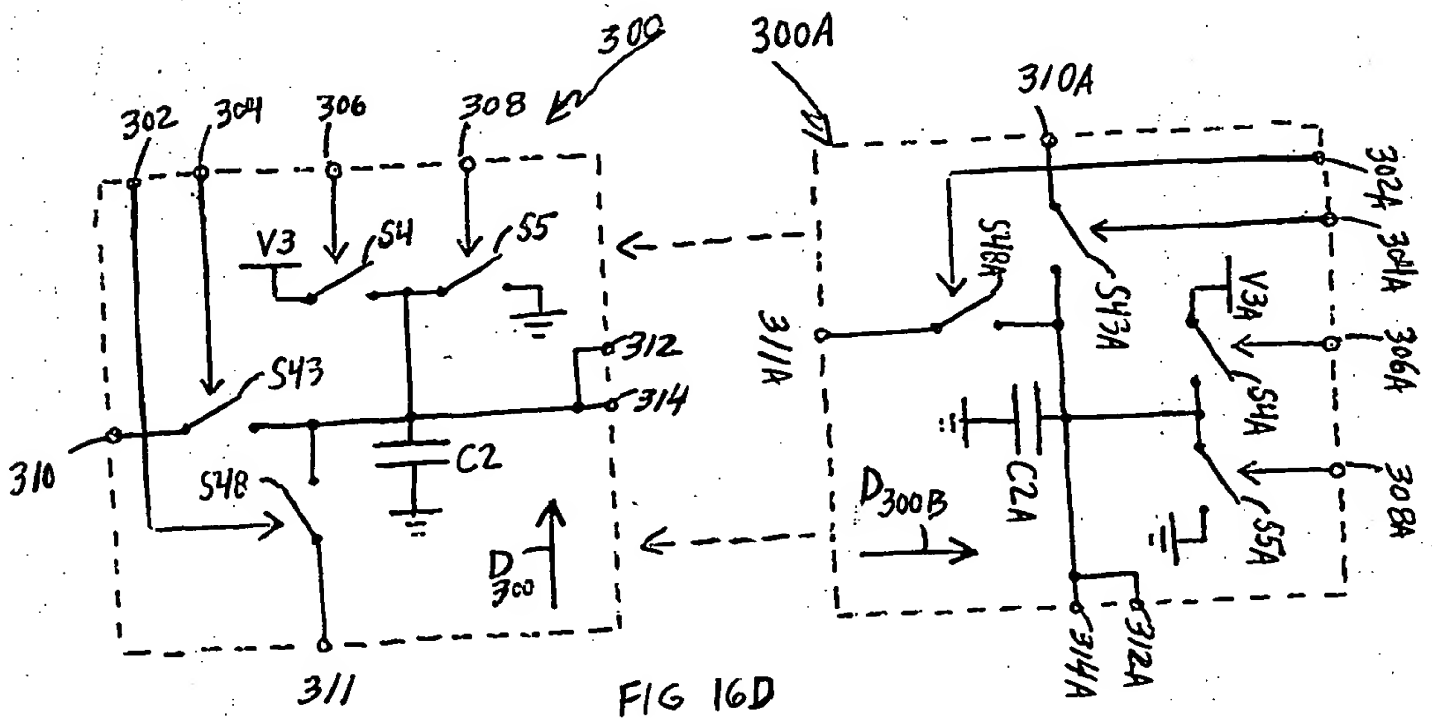
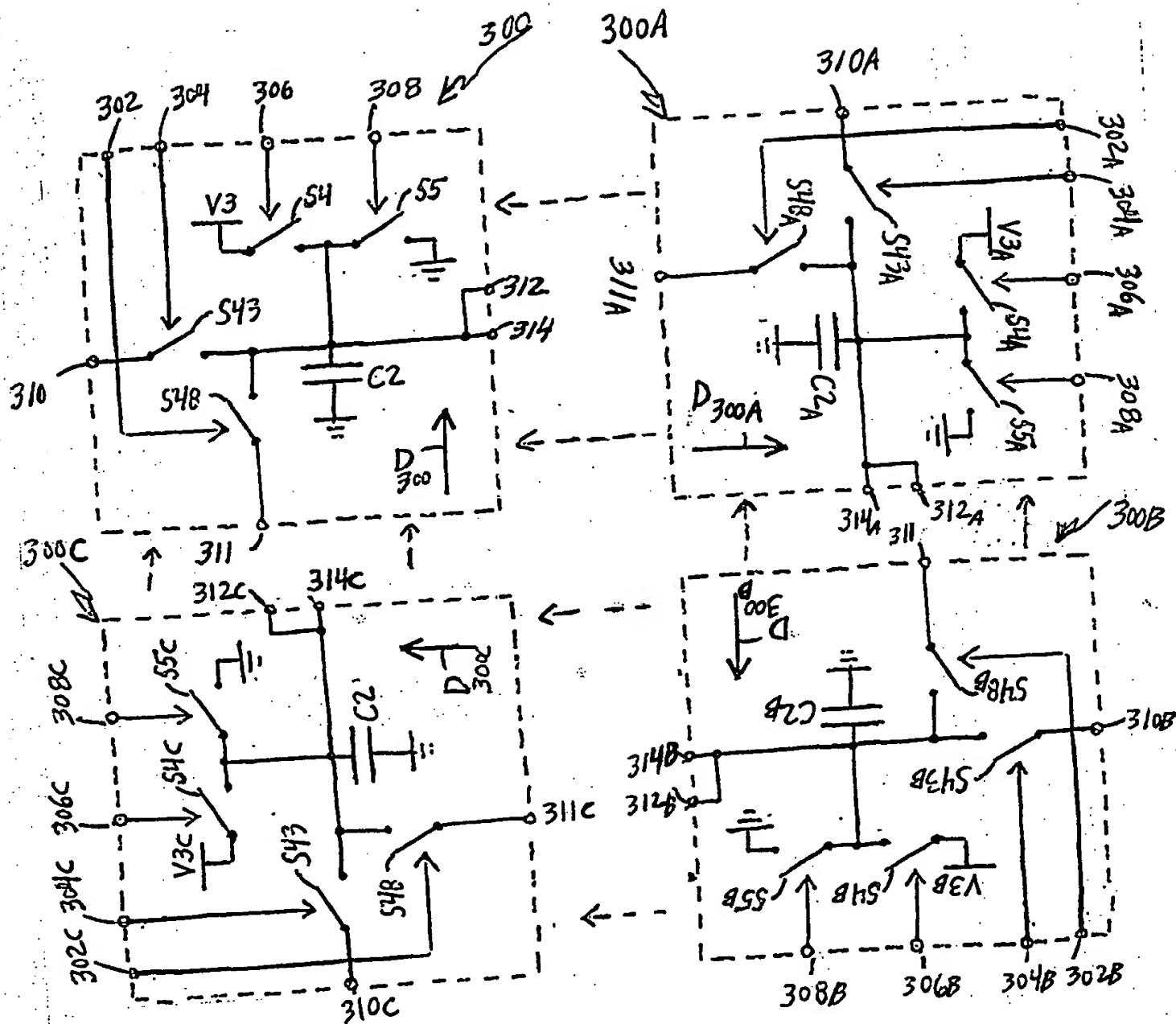


FIG 16D



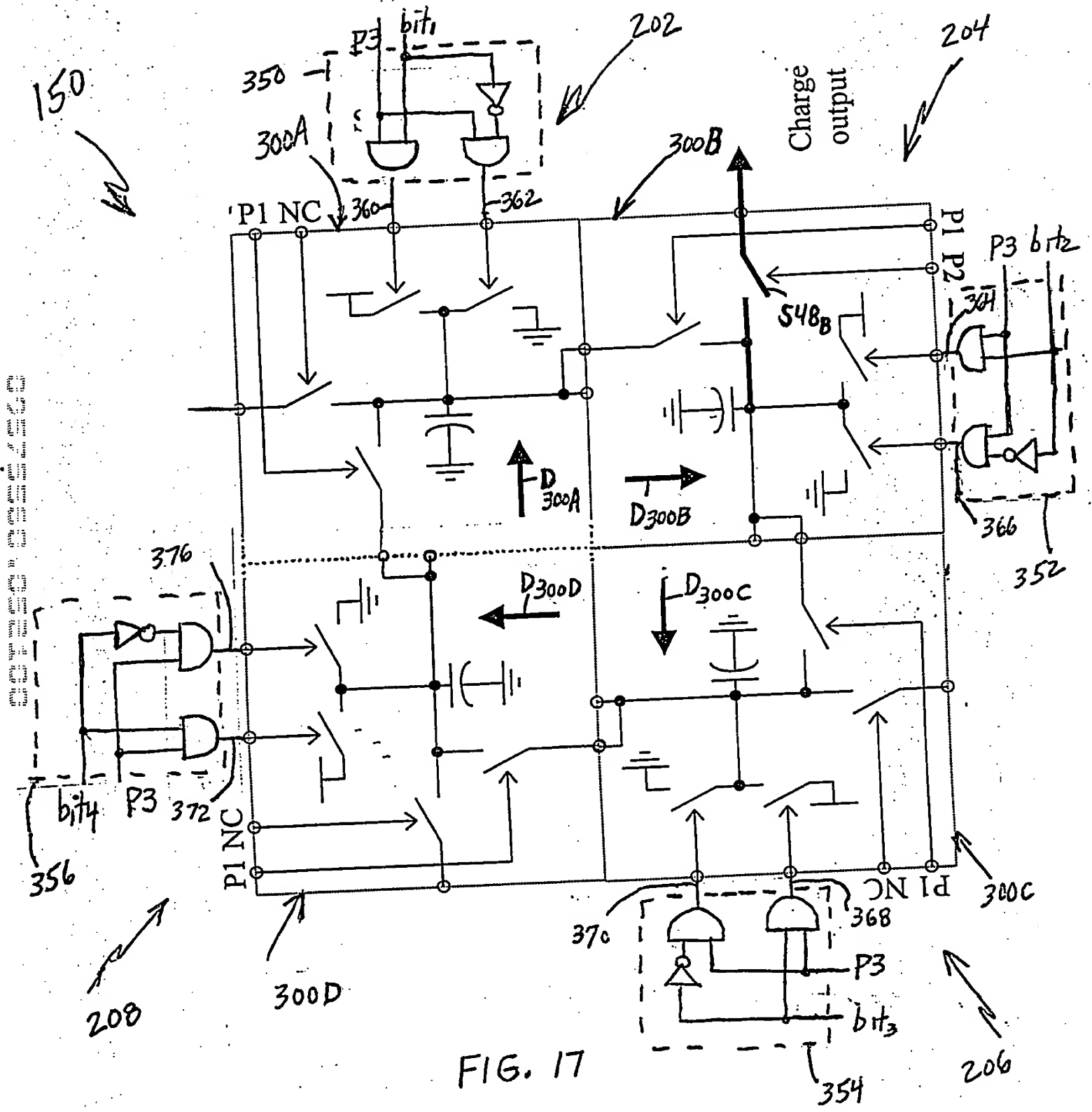


FIG. 17

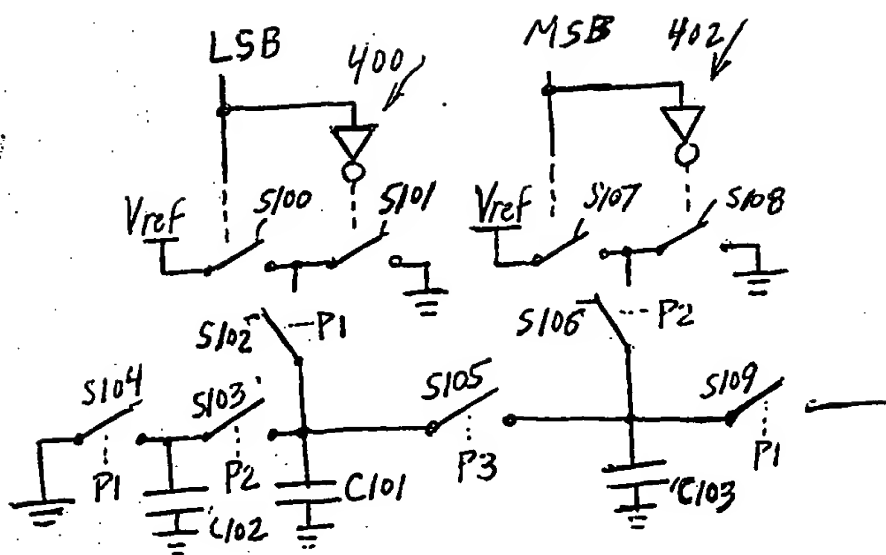
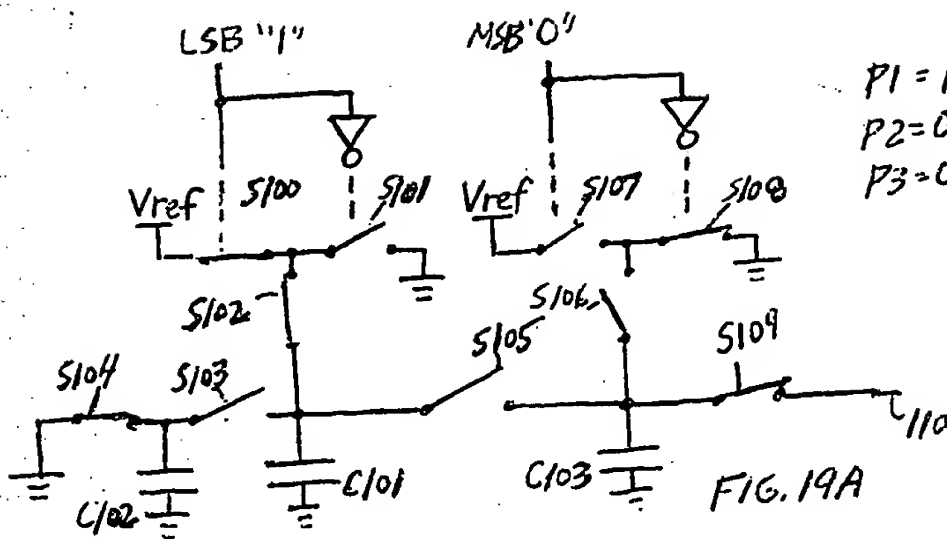
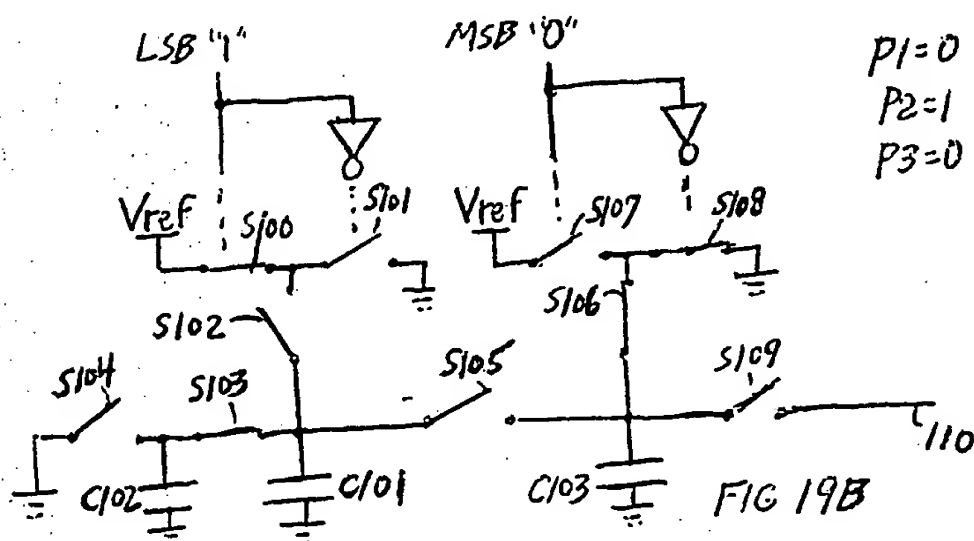


FIG. 18



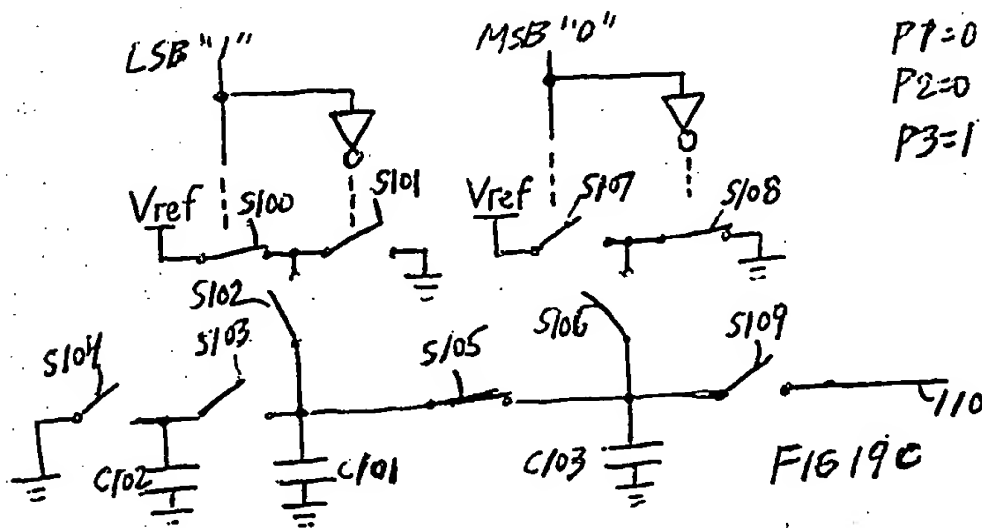
$$\begin{aligned}
 P1 &= 1 & V(C102) &= 0 & Q(C102) &= 0 \\
 P2 &= 0 & V(C101) &= V_{ref} & Q(C101) &= C \times V_{ref} \\
 P3 &= 0 & V(C103) &= ? & Q(C103) &= ?
 \end{aligned}$$

FIG. 19A



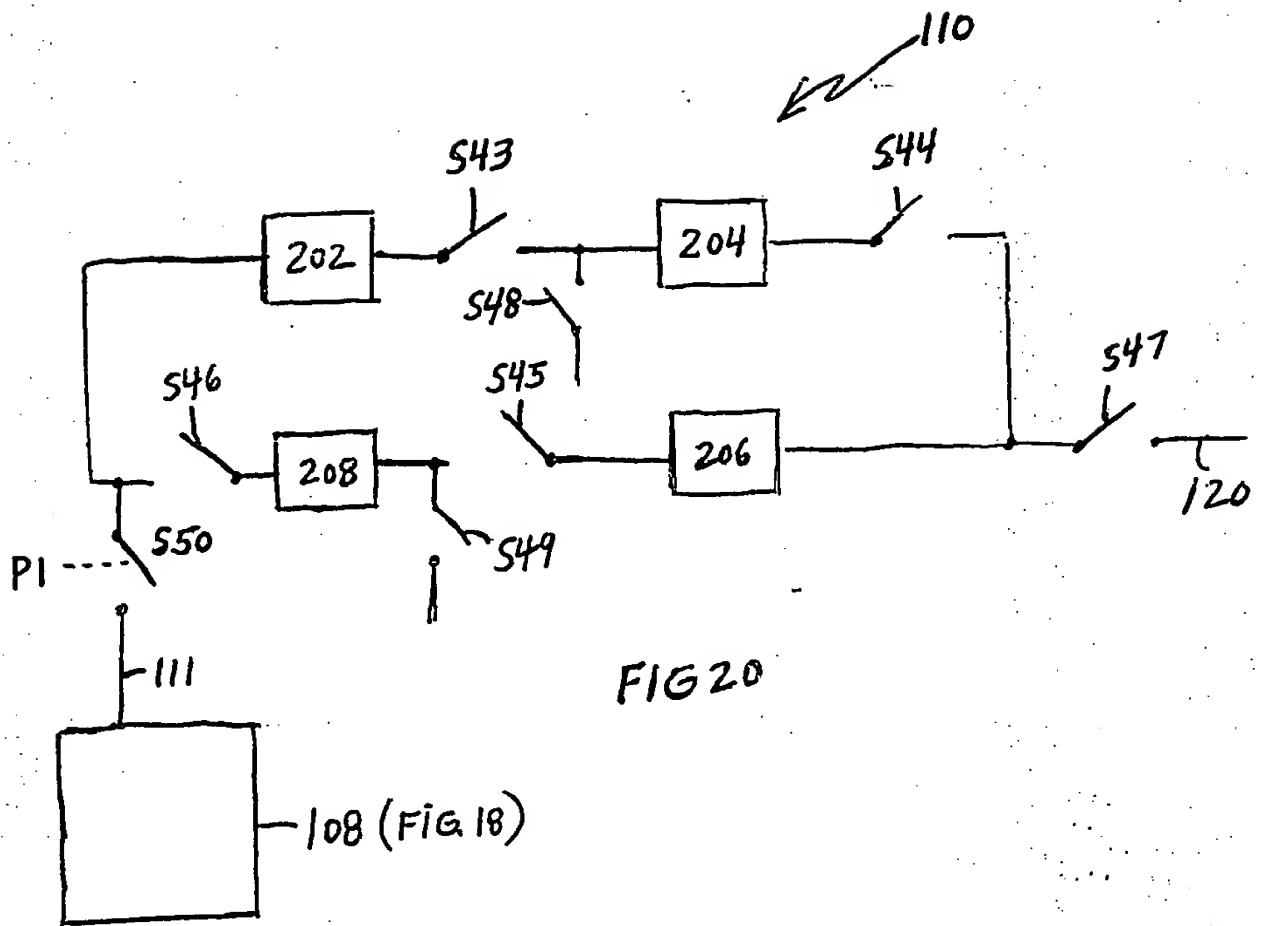
$$\begin{aligned}
 P1 &= 0 & V(C102) &= V_{ref}/2 & Q(C102) &= C \times V_{ref}/2 \\
 P2 &= 1 & V(C101) &= V_{ref}/2 & Q(C101) &= C \times V_{ref}/2 \\
 P3 &= 0 & V(C103) &= 0 & Q(C103) &= 0
 \end{aligned}$$

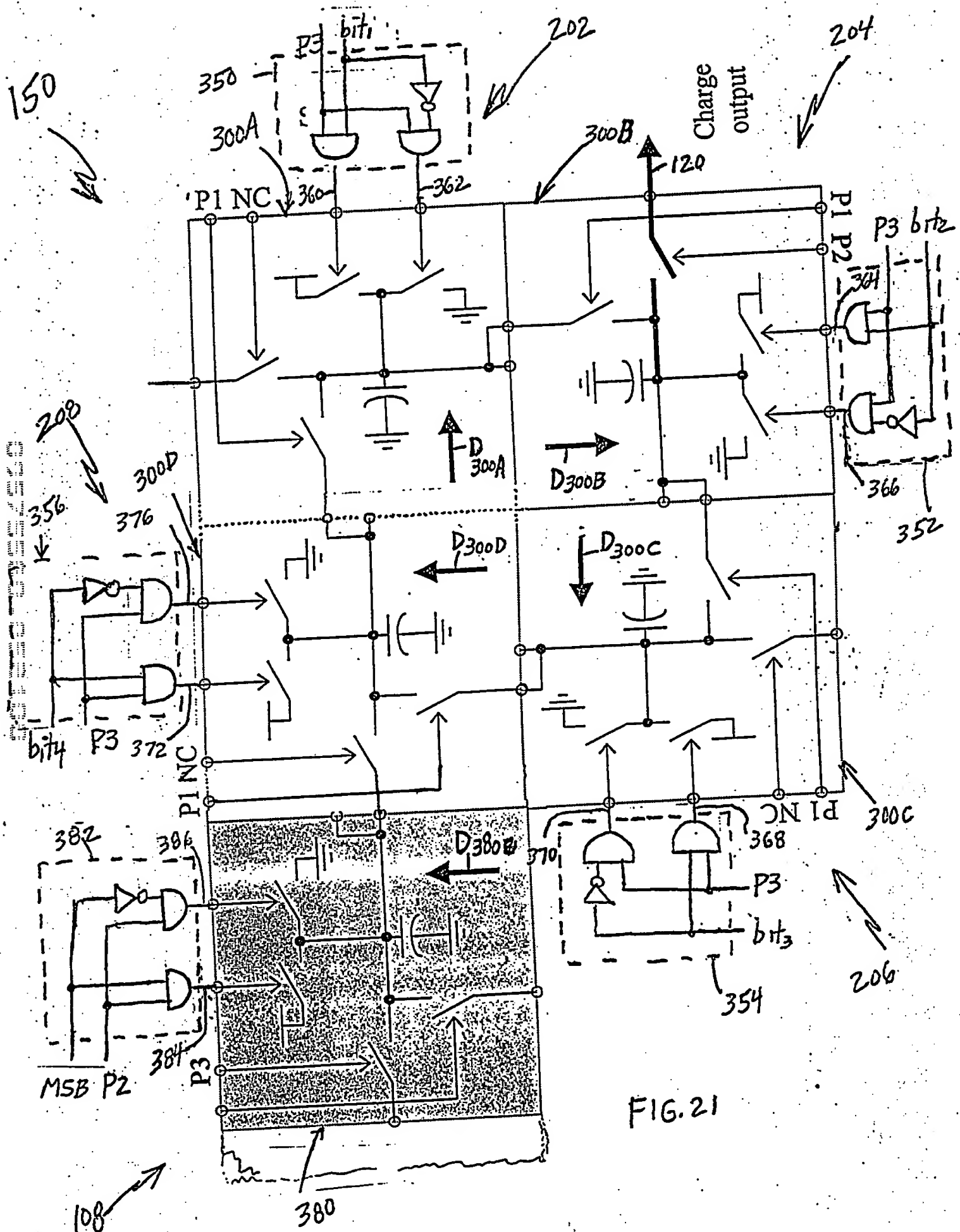
FIG. 19B



$$\begin{aligned}
 P1 &= 0 & V(C102) &= V_{ref}/2 & Q(C102) &= C \times V_{ref}/2 \\
 P2 &= 0 & V(C101) &= V_{ref}/4 & Q(C101) &= C \times V_{ref}/4 \\
 P3 &= 1 & V(C103) &= V_{ref}/4 & Q(C103) &= C \times V_{ref}/4
 \end{aligned}$$

FIG. 19C





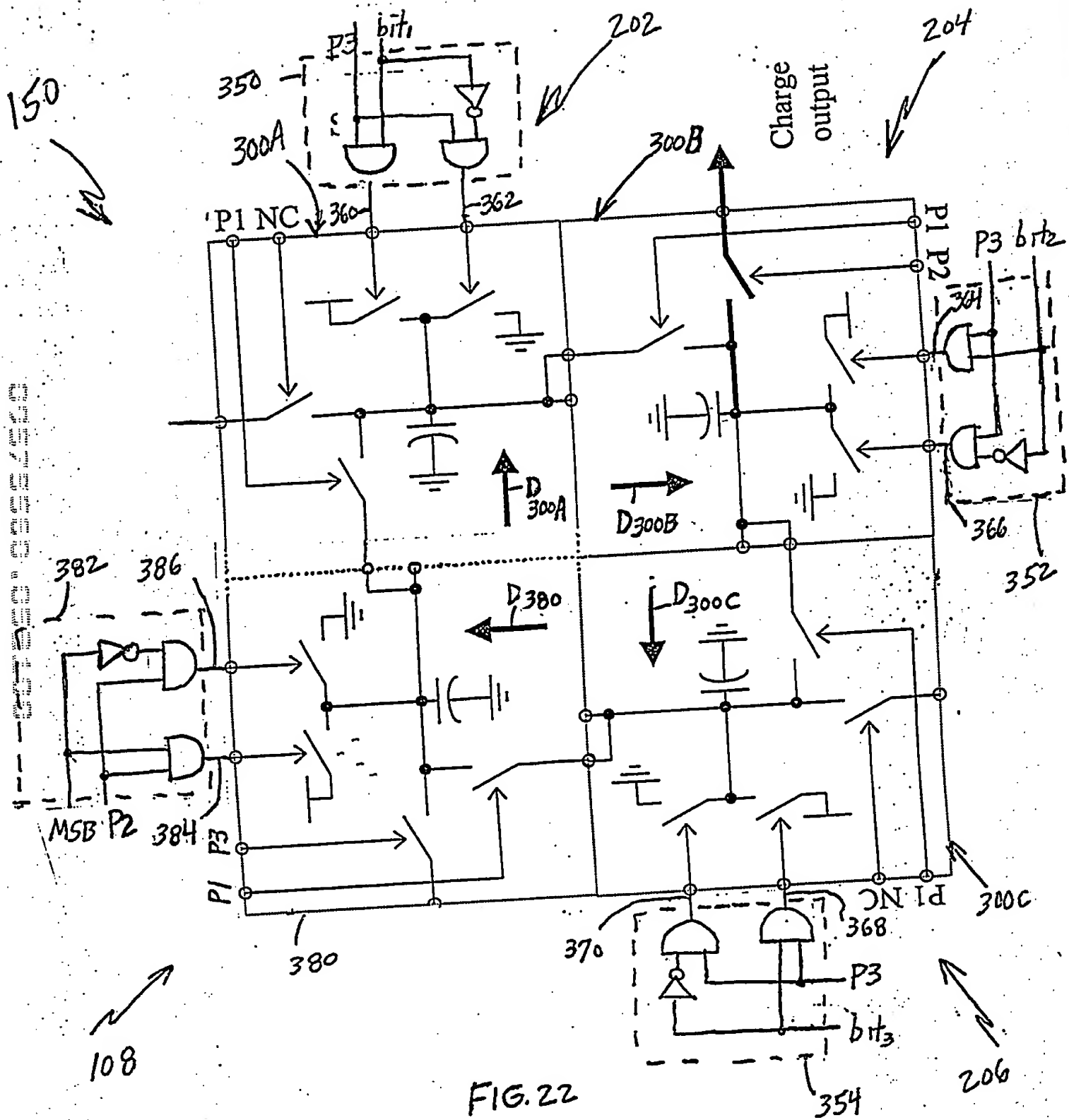


FIG. 22

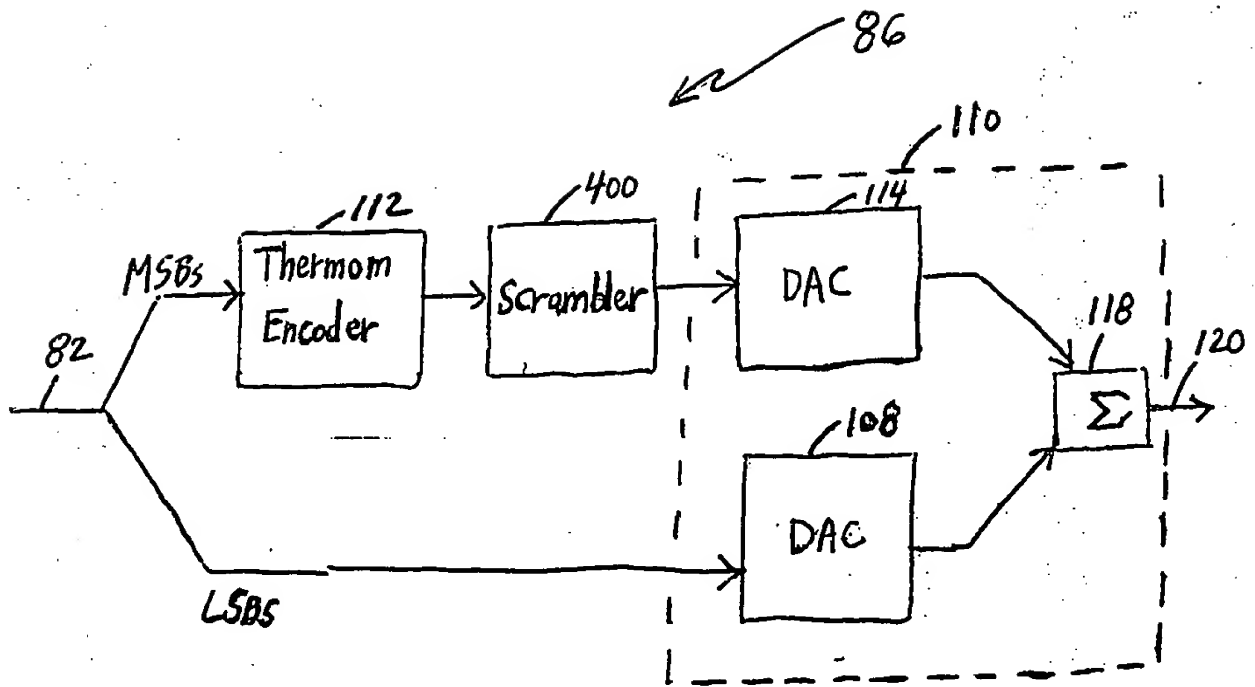


FIG. 23

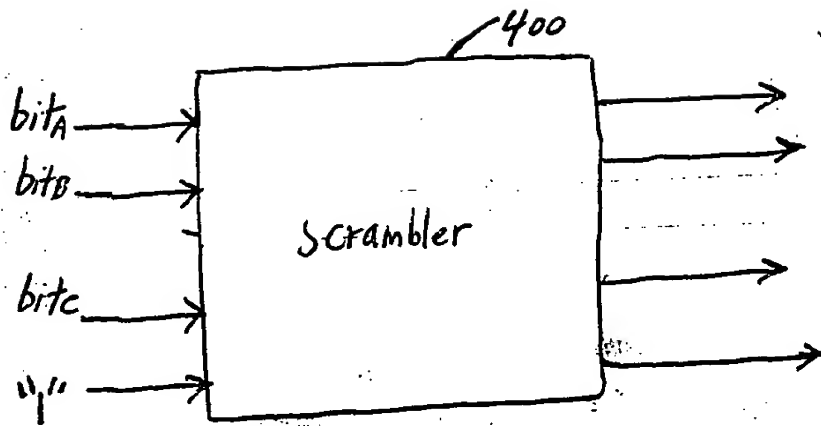


FIG 24

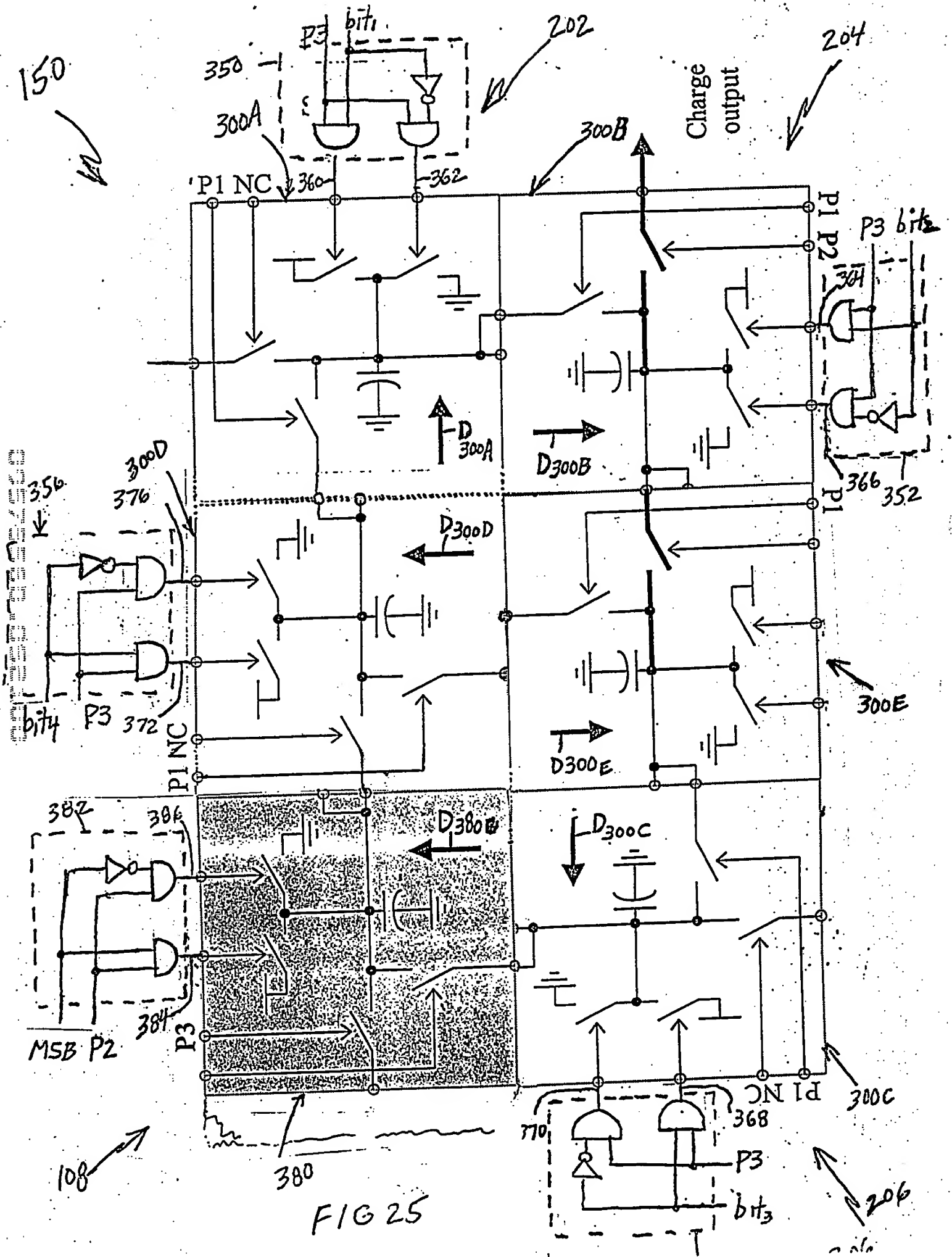


FIG 25

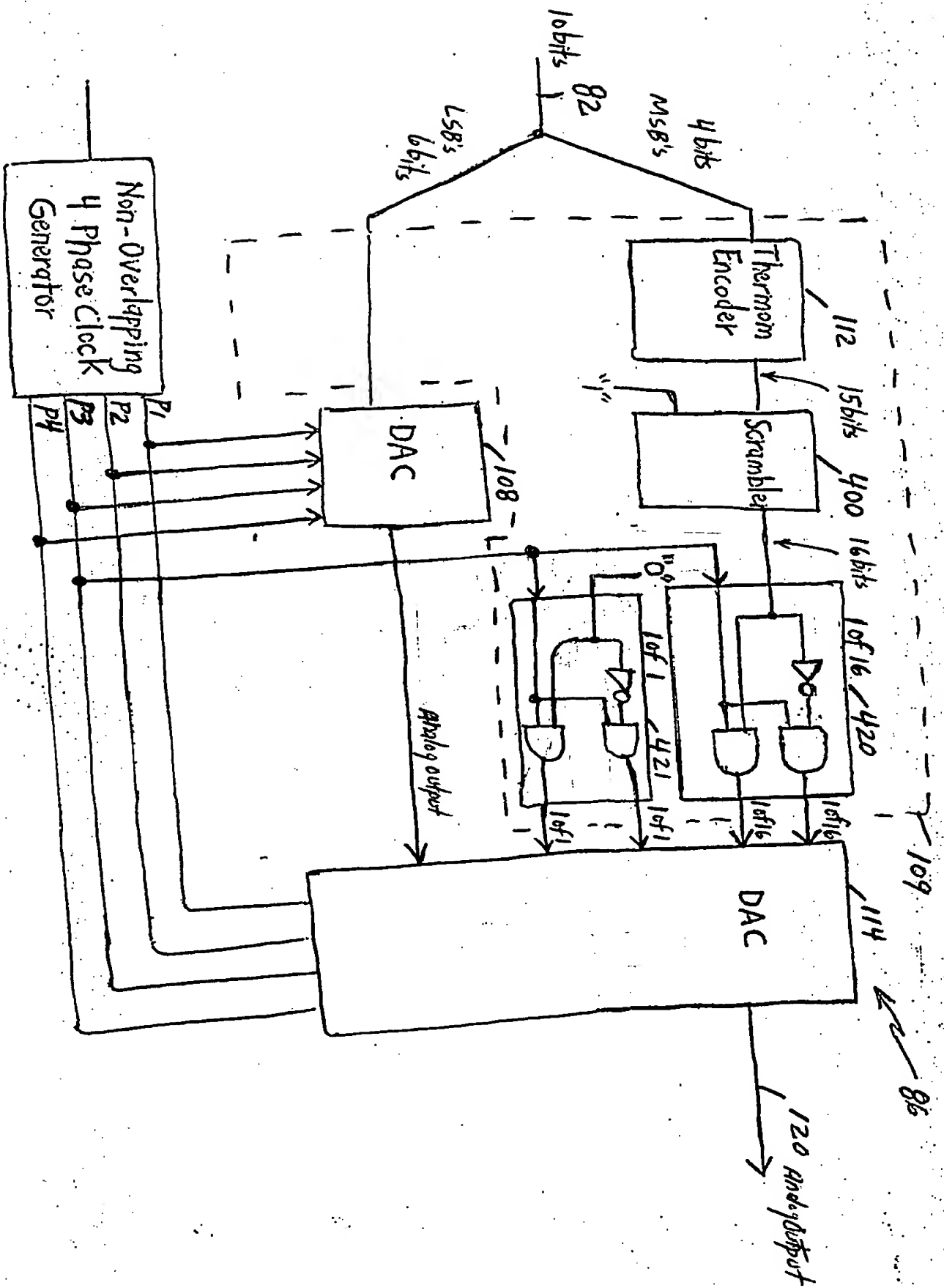


FIG 26

FIG 28A

450

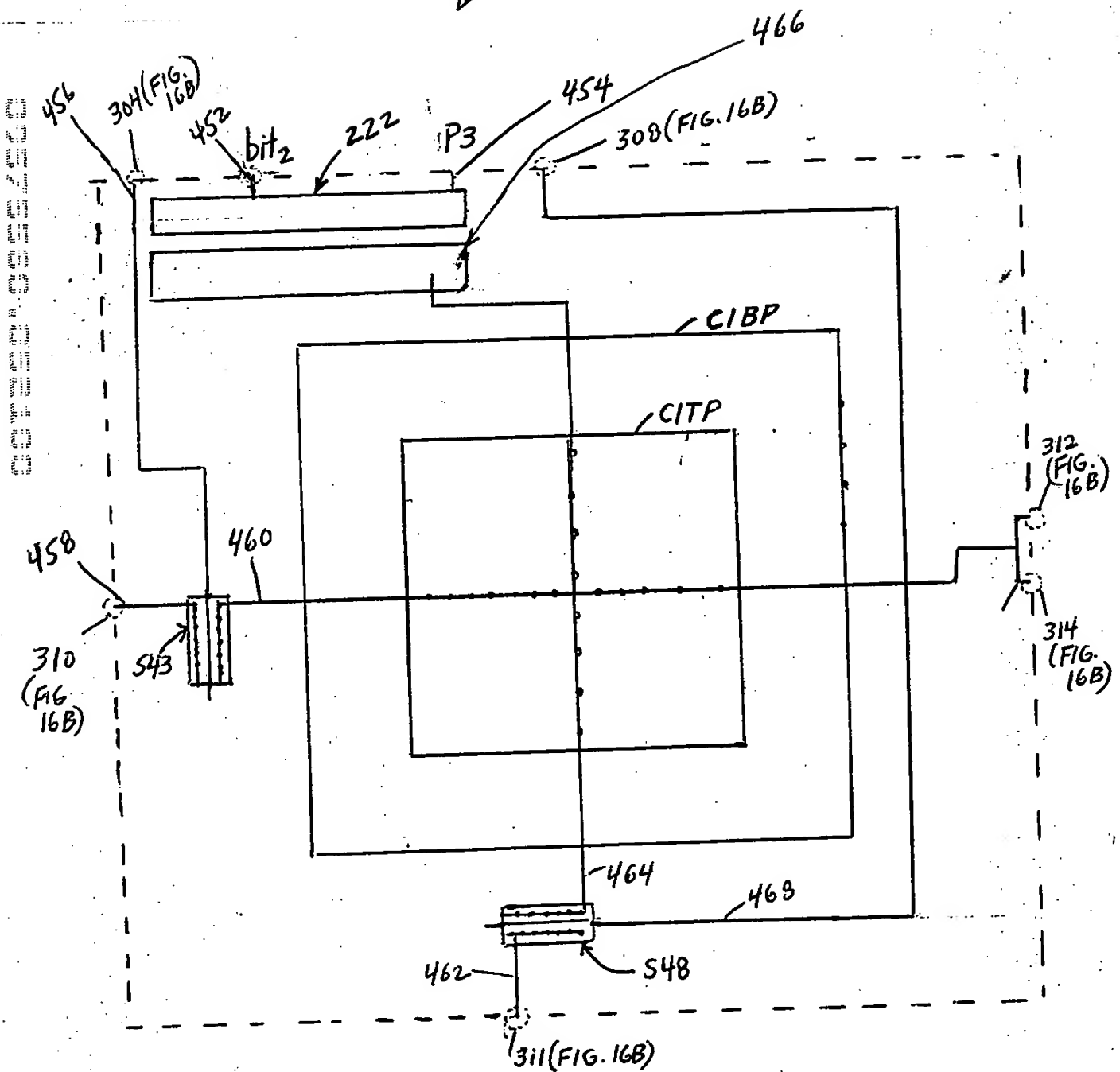
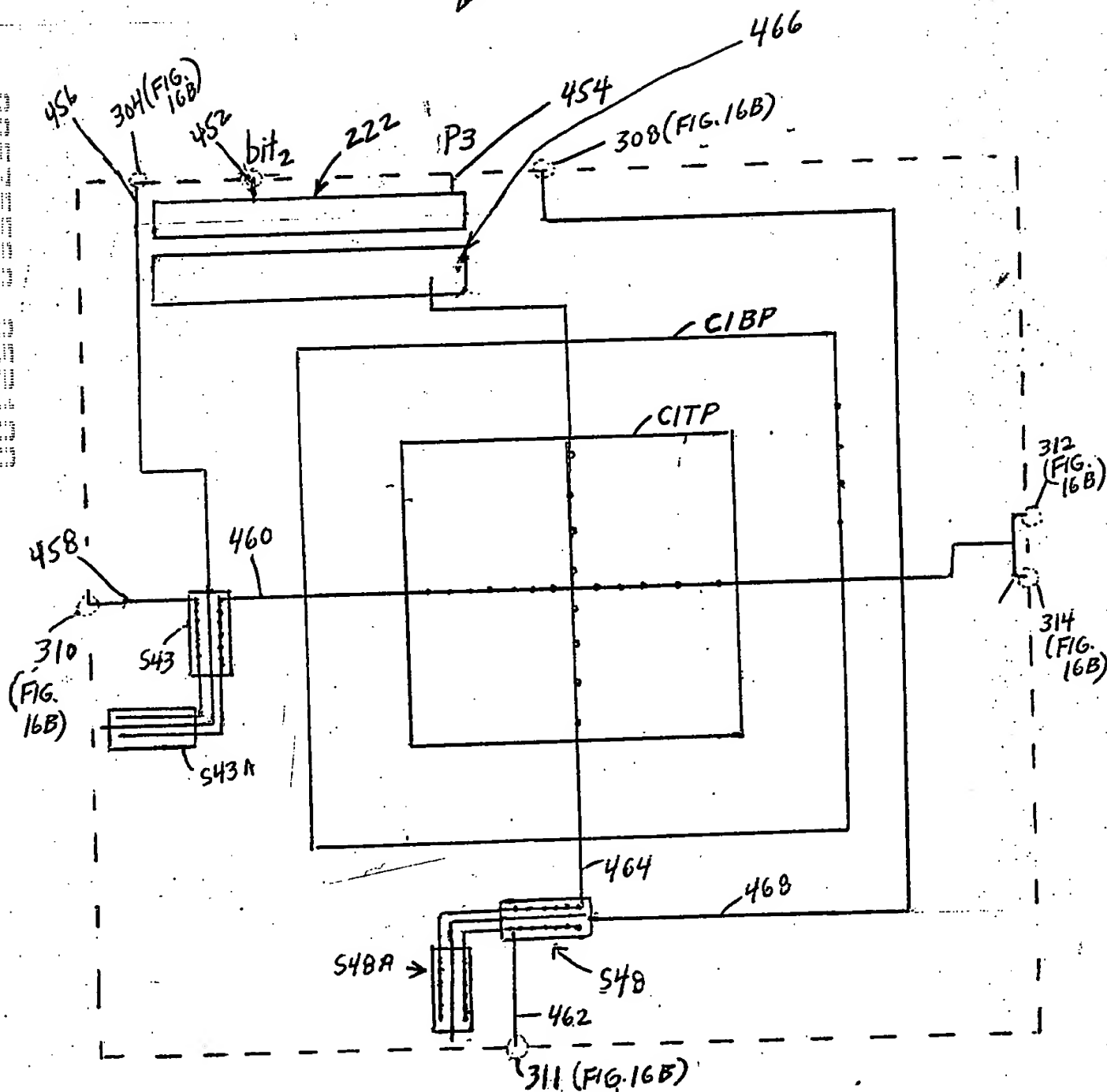


FIG 28B

450



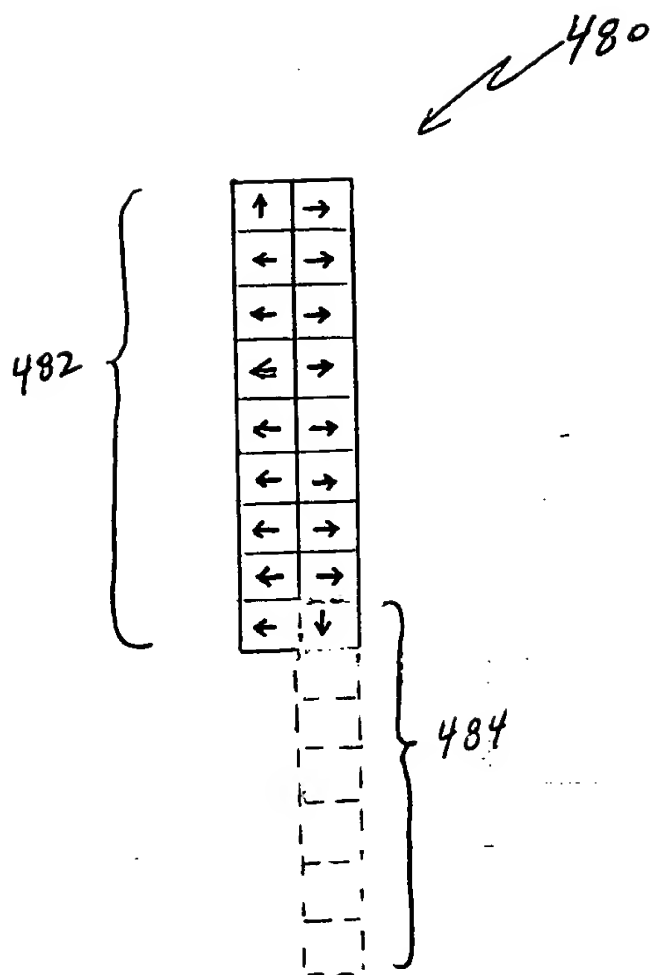


FIG. 29

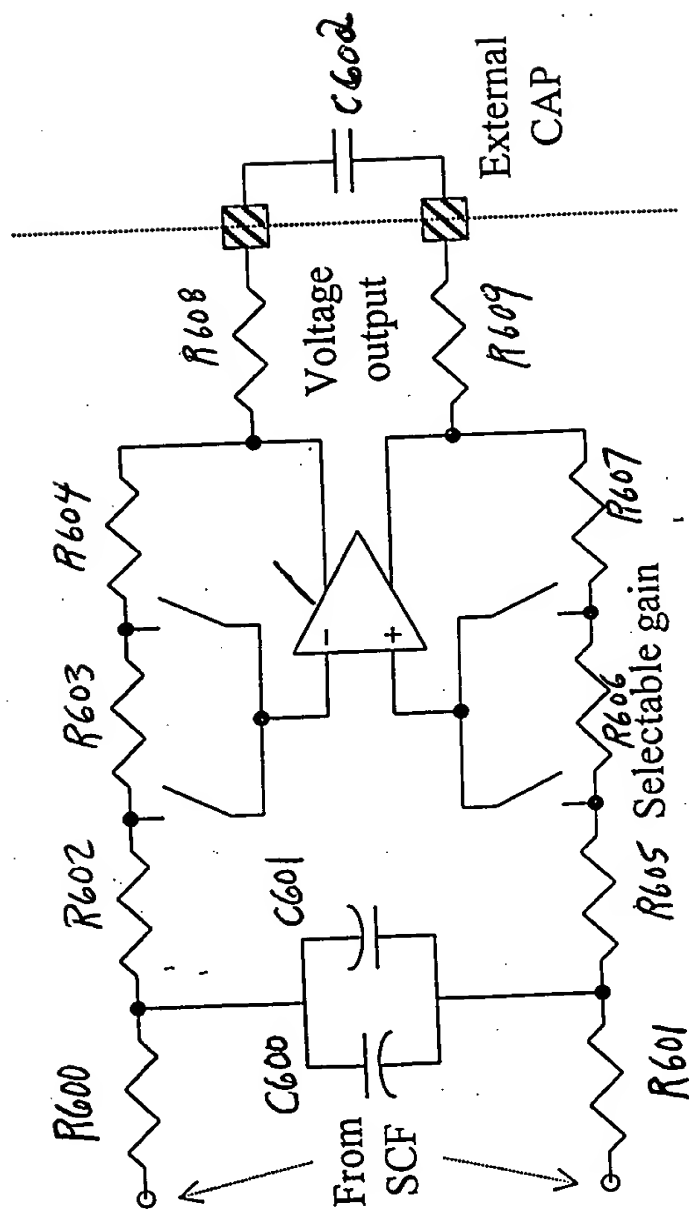


FIG. 30

150

500

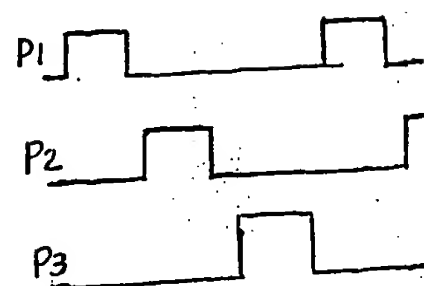
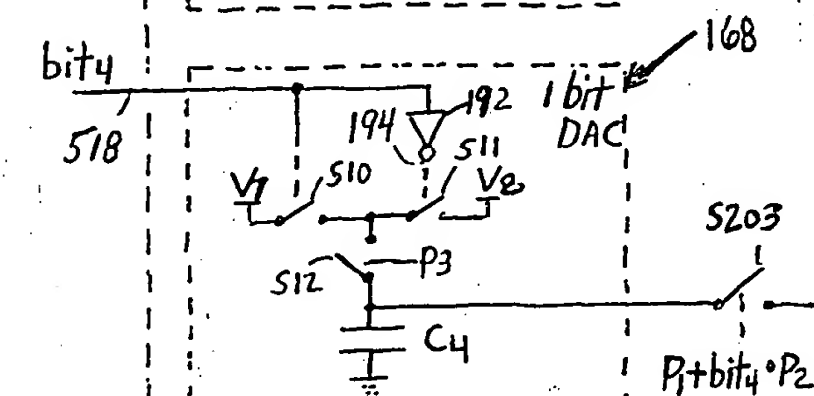
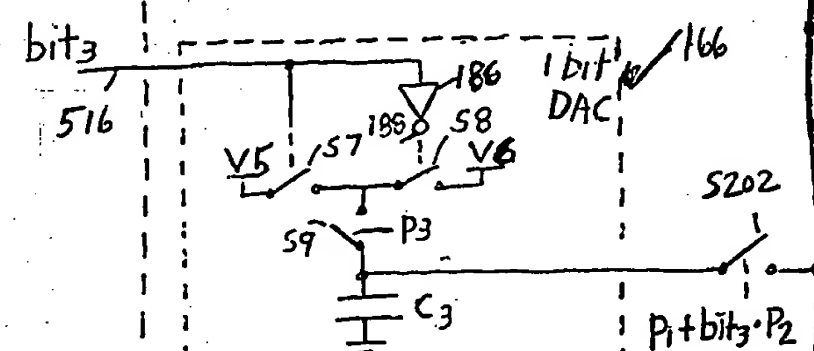
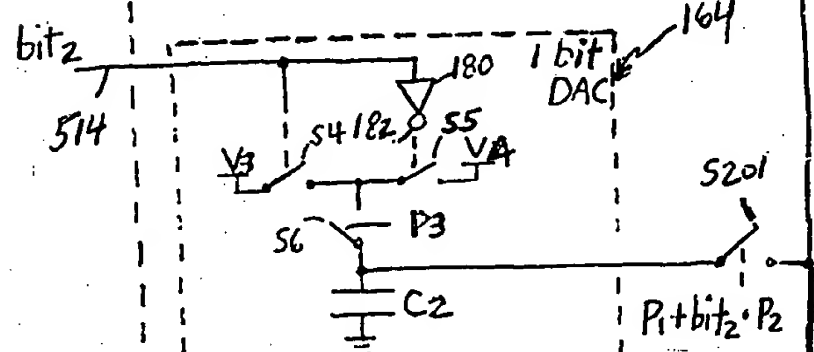
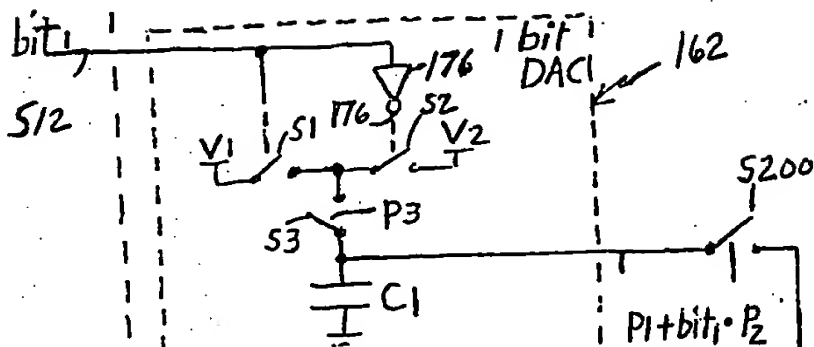


FIG.32

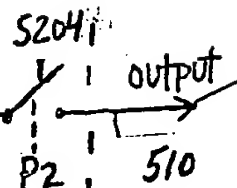


FIG.31

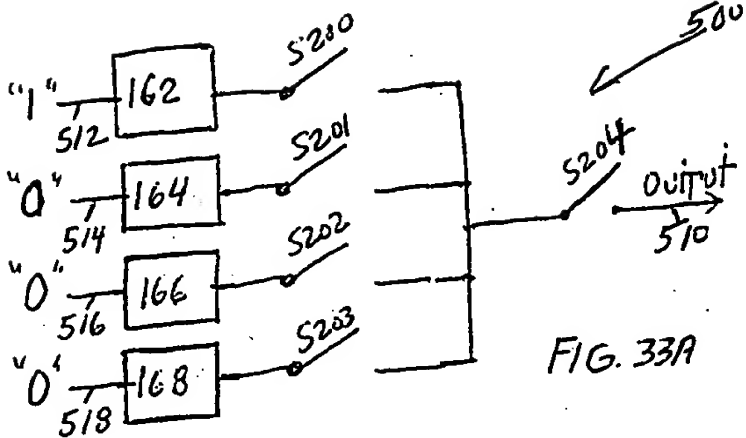


FIG. 33A

P1 "0"	$V(C_1) = V_{ref}$	$Q(C_1) = C \cdot V_{ref}$
P2 "0"	$V(C_2) = 0$	$Q(C_2) = 0$
P3 "1"	$V(C_3) = 0$	$Q(C_3) = 0$
	$V(C_4) = 0$	$Q(C_4) = 0$

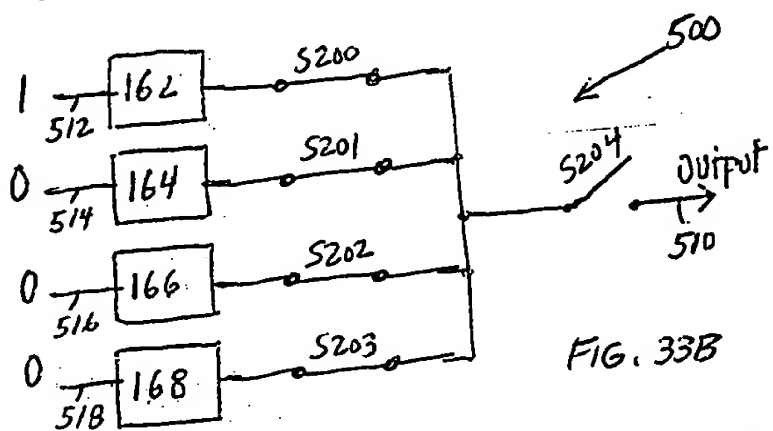


FIG. 33B

P1 "1"	$V(C_1) = V_{ref}/4$	$Q(C_1) = C \cdot V_{ref}/4$
P2 "0"	$V(C_2) = V_{ref}/4$	$Q(C_2) = C \cdot V_{ref}/4$
P3 "0"	$V(C_3) = V_{ref}/4$	$Q(C_3) = C \cdot V_{ref}/4$
	$V(C_4) = V_{ref}/4$	$Q(C_4) = C \cdot V_{ref}/4$

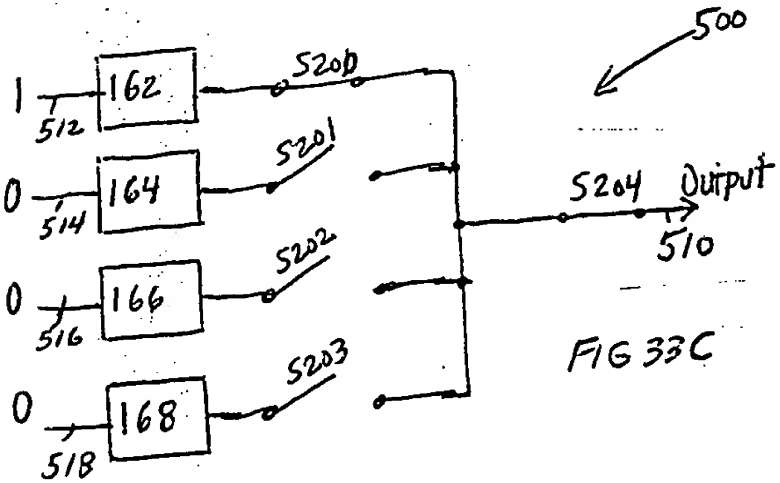


FIG. 33C

P1 "0"	$V(C_1) = V_{ref}/4$	$Q(C_1) = C \cdot V_{ref}/4$
P2 "1"	$V(C_2) = V_{ref}/4$	$Q(C_2) = C \cdot V_{ref}/4$
P3 "0"	$V(C_3) = V_{ref}/4$	$Q(C_3) = C \cdot V_{ref}/4$
	$V(C_4) = V_{ref}/4$	$Q(C_4) = C \cdot V_{ref}/4$

Q delivered to output terminal is $Q(C_1) = C \cdot V_{ref}/4$

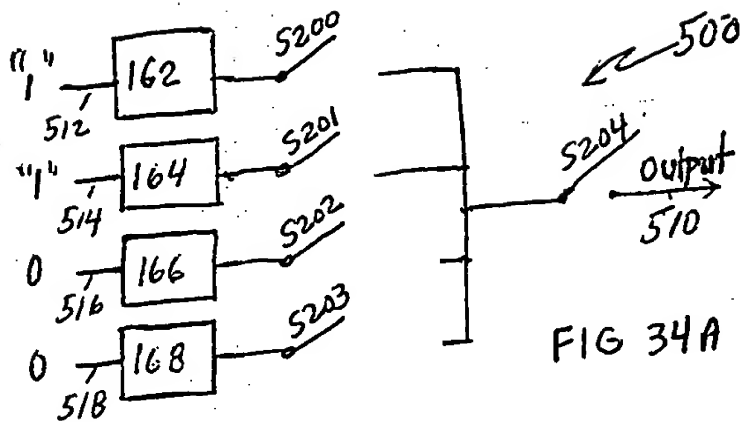


FIG 34A

P1 "0"	$V(C_1) = V_{ref}$	$Q(C_1) = C \cdot V_{ref}$
P2 "0"	$V(C_2) = V_{ref}$	$Q(C_2) = C \cdot V_{ref}$
P3 "1"	$V(C_3) = 0$	$Q(C_3) = 0$
	$V(C_4) = 0$	$Q(C_4) = 0$

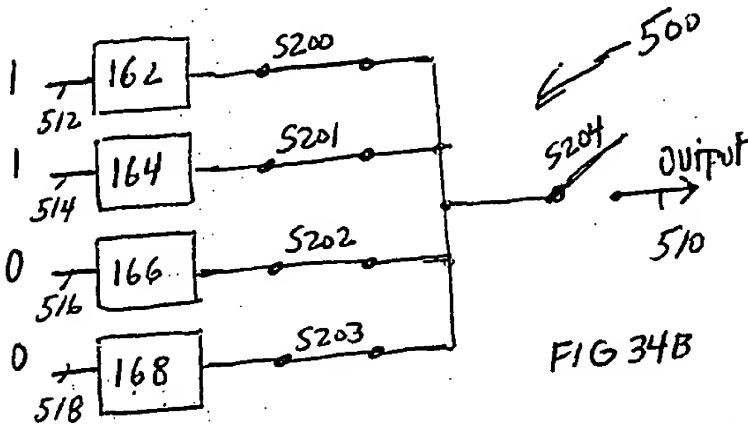


FIG 34B

P1 "1"	$V(C_1) = V_{ref}/2$	$Q(C_1) = C \cdot V_{ref}/2$
P2 "0"	$V(C_2) = V_{ref}/2$	$Q(C_2) = C \cdot V_{ref}/2$
P3 "0"	$V(C_3) = V_{ref}/2$	$Q(C_3) = C \cdot V_{ref}/2$
	$V(C_4) = V_{ref}/2$	$Q(C_4) = C \cdot V_{ref}/2$

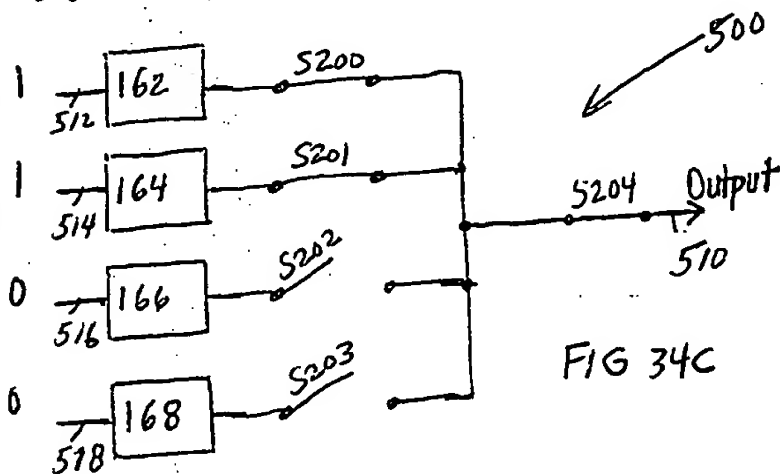


FIG 34C

P1 "0"	$V(C_1) = V_{ref}/2$	$Q(C_1) = C \cdot V_{ref}/2$
P2 "1"	$V(C_2) = V_{ref}/2$	$Q(C_2) = C \cdot V_{ref}/2$
P3 "0"	$V(C_3) = V_{ref}/2$	$Q(C_3) = C \cdot V_{ref}/2$
	$V(C_4) = V_{ref}/2$	$Q(C_4) = C \cdot V_{ref}/2$

Q delivered to output terminal
is $Q(C_1) + Q(C_2) =$

$$C \cdot V_{ref}/2 + C \cdot V_{ref}/2 = C \cdot V_{ref}$$

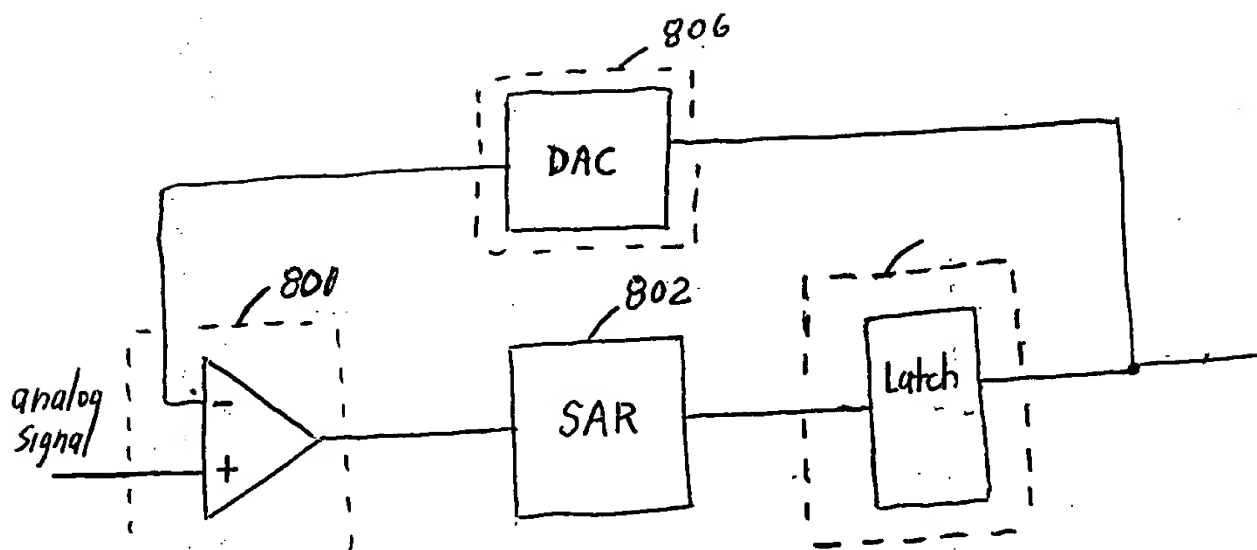


FIG. 35